http://waterheatertimer.org/Troubleshoot-Rheem-Tankless-water-heater.html

Tankless Gas Water Heaters
Second Generation
Indoor, Outdoor and Direct Vent
Up to 199,000 BTU

Includes RTG2-42, RTG53, RTG66 and RTG74 models

Table of Contents

Specifications common to all product lines **4**
Product (Model) History **5**
Sequence of Operations **7**
Sensors and Safety **8**
Oxygen Depletion Sensing System Operation 8
How to Reset the Four (4) Hour ODS Timer 9
Overheat Film Wrap 9
Heat Exchanger Thermistor 10
Maintenance Panel Display **10**
Clearing the Fault History **11**
Adjusting the Burner Control Assembly (Printed Circuit Board) **11**
How to Check Manifold Gas Pressure **12**
Program Chip Adjustment **13**
Changing the Maximum Temperature Setting to 140° **14**
Changing the Maximum Temperature Setting to 120° **14**
Error Codes **15**
Diagnostic Points on Printed Circuit Board **18**
Thermistor Resistance Chart **19**
Fan Speed Chart **20**
RTG2-42 ..... **21**
Wiring Diagram 21
Printed Circuit Board 22
RTG 53 ..... **23**
Wiring Diagram – RTG 53 23
Printed Circuit Board – RTG 53 24
RTG 66 ..... **25**
Wiring Diagram 25
Printed Circuit Board 26
Error Code 11 (RTG66 Only) 26
Error Code 11 (RTG66 Only) 27
Error Code 51 (RTG 66 Only) 30
Error Code 61 (RTG 66 Only) 31
Error Code 65 (RTG66 Only) 32
Error Code 66 (RTG66 Only) 33
RTG 74 ..... **34**
Wiring Diagram – RTG 74 34
Printed Circuit Board – RTG 74 35
MIC-180 & EZ Link **36**
MIC-180 Printed Circuit Board 36
Error Code 03 (MIC-180 & EZLink Only) 37
Test Run Mode 37
MIC 180 Maintenance Mode Table 38
Maintenance Information Mode 38
2nd Generation Flame Rod Chart **39**

Troubleshooting 40
Troubleshooting Format and Example 40
Unit Will Not Power On 41
Error Code 00 44
Warning Code 05 44
Warning Code 10 45
Error Code 11 45
Error Code 12 49
Error Code 13 50
Error Code 14 51
Error Code 15 52
Error Code 16 53
Error Code 21 (Indoor Models Only) 53
Error Code 24 54
Error Code 29 54
Error Code 31 54
Error Code 31 55
Error Code 32 55
Error Code 33 56
Error Code 34 56
Error Code 35 57
Error Code 38 57
Error Code 51 57
Error Code 52 58
Error Code 61 59
Error Code 65 59
Error Code 66 (RTG66 Only) 60
Error Code 71 60
Error Code 72 60
Error Code 76 61
Error Code 79 61
Error Code 80/81 61
Error Code 82 61
Error Code 90 62
Error Code 99 63
Warning Code IL 63
Warning Code P1 64
Disassembly and Repair – 1st Generation 7.4 product series 64
Printed Circuit Board (PCB) 64
Air Filter Switch 65
Water Inlet Solenoid 65
Hot Water Outlet 66
Transformer 66
Fan Assembly 67
Proportional Gas Flow Regulator 68
Burner Plate Cover 69

Burner Assembly 69
Igniter and Igniter Probes..... 70
Flame Rod(s)..... 70
Heat Exchanger Thermistor 70
Parts 71
Parts Exploded View for RTG2-42PV and RTG 53PV..... 74
Parts Exploded View for RTG 53X..... 75
Parts Exploded View for RTG 53DV 76
Parts Exploded View for RTG 66DV 77
Parts Exploded View for RTG 74PV and GT 199PV..... 78
Parts Exploded View for RTG 74DV and GT 199DV 79
Parts Exploded View for RTG 74X and GT 199X..... 80

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Order Center
1-800-621-5622

RHEEM WATER HEATERS
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Before inspecting, diagnosing, repairing or operating any water heater, be sure to examine all of the safety and warning labels on the tank. Follow the instruction on these warning labels. Read and understand the Use and Care Manual that was shipped with the water heater. Failure to do so can result in unsafe operation of the water heater resulting in property damage, bodily injury, or death. Should you have any problems reading or following the instructions in the Use and Care Manual, seek the help of a licensed and qualified professional.

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Specifications common to all product lines

Model	See specification sheets for current models and specs	
Purpose	Domestic Hot Water (DHW) supply for showers, cleaning and laundry	
Rated Gas Input (Btu/Hr.) Modulating	See specification sheets for current models and specs	
Dimensions	See specification sheets for current models and specs	
Installation	Indoor Wall Mounting - can be vented either horizontally or vertically. Outdoor Wall Mounting - no installed venting required. Direct Vent – uses special concentric venting for indoor installation.	
Working Water Pressure	14 psi minimum; 150 psi maximum	
Minimum Water Flow	0.66 gallons per minute to turn on burner	
Maximum Flow Rate	Based on a 45 degree rise; See specification sheets for current models and specs	
Gas Connection	3/4" NPT Male	
Water Connection	3/4" NPT Male	
Vent Size	3 or 4" Stainless Steel Venting (Category III); 3/5 or 4/7 Direct Vent Stainless Steel Venting (Category III)	
Max. Vent Length	See use and care manual for each product type	
Inlet Gas Pressure	Natural Gas: Min. 4.0" w.c. Max. 10.5" w.c. L.P. Gas: Min. 8.0" w.c. Max. 14.0" w.c.	
Hot Water Supply	Factory Setting	100°F (With Supplied UMC-117)
	Adjusting Range (All second generation products will go to 140°F out of the box with DIP switch adjustment.)	Main Control 100°F - 120°F (140°F)
		Bath control 100°F - 120°F
	Max. Setting – Commercial Heavy Duty only	Up to 180°F with dip switch adjustment and UMC Main Remote Control
Electrical	Electrical Rating	120 VAC/60Hz, 3 Amps
	Wire	3 (three) Pin Power Supply Cord
	Fuse	3A Fuse x 2 (line voltage); 5A fuse on circuit board
Safety Devices	Oxygen Depletion Safety Device (Indoor units only)	
	Over Heat Limiter for Heat Exchanger	
	Heat Exchanger Thermistor (Boiling Point Safety)	
Freeze Protection	Minus 30°F (Without Wind-Chill Factor) with power applied	
Remote Control	Main Remote Control (UMC-117) Standard Bath Remote control (USC1-117) optional Second Bath Remote (USC2-117) optional	

For the must current specification sheets and use and care manuals, see the website at www.rheemtankless.com.

Product (Model) History

Implementation Date	Models Affected	Modification/Upgrade	New Parts	Board Programming
September 2004	RTG42	Initial Tankless Product Launch	n/a	n/a
May 2005	RTG74	Initial Product Launch	n/a	n/a
Dec 2006	RTG74	Gas Valve change; also included new fuel supply tubes from gas valve to burner assembly		
	RTG74	Water pipes changed. Removed the two speed clips from the cold in and water by-pass.		
Second Generation				
August 2006	RTG2 42	Upgraded product launch on new chassis	n/a	n/a
		No air filter switch	n/a	n/a
	RTG 53 series	Initial Product Launch	n/a	n/a
		No air filter switch	n/a	n/a
	'dash one' RTG74	Added EZ link function to <u>all</u> similar models	EZ link Cable	Yes
		Added UMC Main remote control as standard to <u>all</u> models; allowed residential units to heat to 140^0 F	UMC 117 Main	Yes
		Removed 60 minute lockout timer for return circulation function	No	Yes
		Power Restore Auto On feature added. Unit resets to last recorded temperature setting	No	Yes
		Water flow inlet valve solenoid will close completely when using EZ link cable or MIC 180	No	Yes
		Allowed <u>all</u> 2nd generation units to be installed with MIC 180	No	Yes
Sep29 + Oct 2006	New 'dash one' RTG 74	RTG 74 chassis only	Yes	Yes

Implementation Date	Models Affected	Modification/Upgrade	New Parts	Board Programming
		Flame rod and igniter on right hand burner swapped; added a 'target' for the spark to hit	Burner	No
		Improved burner cover plate	Burner cover plate	No
		New programming chip – all RTG74 models. The new burner plate cover modified the air flow characteristics. This means the chip programming had to change.	Programming Chips; this is when the 2 chips in a bag started.	Yes
December 5, 2006	'dash two' model	RTG 74 chassis only	Yes	Yes
		Removed transformer. 120v AC is the primary power source to board	No	Yes
		Manifold pressure changed	No	Yes
		Programming chip changed to reflect new manifold pressures	Programming Chips	Yes
		Moved gas inlet connection to outside the chassis for easier replacement	No	No
	RTG 53/2-42 chassis			
		New igniter | New wire harness for igniter | New location	Yes	Yes
July 1, 2008	RTG 66	Direct Vent model only; altitude configured via dip switch settings; inlet gas pressure check port added	Many	Yes

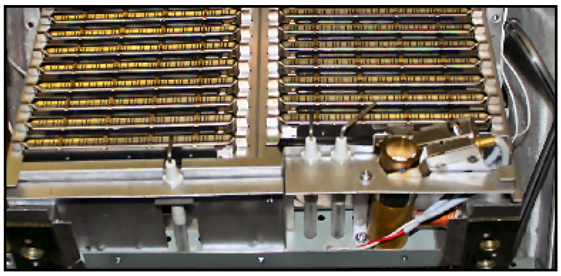
Sequence of Operations

Action		***Explanation***
Hot water faucet is open creating a demand		Hot water draw initiates water flow thru the machine.
Water flows through the Water Flow Sensor		Minimum flow rate of .66 gallons per minute.
Printed Circuit Board (PCB) senses the flow rate has reached a minimum demand of 0.66 gpm		PCB is the 'brains' of the machine and controls all input and actions during sequence of operations.
Fan conducts a pre-purge		Pre purge is designed to verify we have a clear and clean vent.
The Proportional Gas Flow Regulator allows the gas to flow to the main burner		PGFR opens to full BTU input initially.
At the same time, the igniter continuously sparks and ignites the main burner		The spark igniter ignites the fuel in the main burner area. Both left and right burner will fire initially.
After ignition, the Flame Rods sense and monitor the flame and ensures combustion		The purpose of the flame rods is to verify flame. In the event of flame failure (or presence when none is expect) the unit will go into an error code.
The ***"In Use Indicator"*** on remote control turns "ON" (Red) and the ***Priority Indicator*** turns Green (multiple remote controls).		Main Burner is now lit. The PCB goes thru a series of calculations (input sensing) to balance out the cold-water temperature, the thermostat setting, the hot outlet temperature and the BTU required to heat the water.
The Proportional Gas Flow Regulator Valve continuously adjusts the gas volume in order to maintain the outlet temperature. The water flow sensor also adjusts the proper amount of cold water mix flow to supply a stable hot water temperature at all times. A signal is also sent to the fan motor in order to constantly maintain the correct proportion between the gas volume and air volume.		Again, the PCB is constantly monitoring all of these inputs and actions to ensure the outlet water temperature is within 1 degree of thermostat setting. It also monitors the BTU required to heat the cold water to the thermostat setting and adjusts the gas valve accordingly.

Action		*Explanation*
(For indoor model only) When the air intake is blocked, or oxygen in a room is not sufficient, the output of the thermocouple that is located in the Oxygen Depletion Sensing Burner (ODS) will change.		The PC Board senses this change and controls the Fan and Proportional Gas Control Valve in order to prevent imperfect combustion. If the control board cannot correct such condition, the unit will go into an error code.
When the hot water tap is closed, the flow rate signal from water flow sensor stops.		Gas valve is closed. Main burner shuts off.
The fan conducts a post purge.		The purpose of the post purge is to cool the heat exchanger.

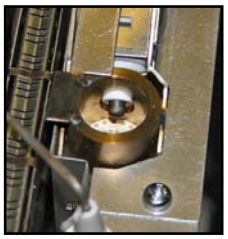
Sensors and Safety

Oxygen Depletion Sensing System Operation



Oxygen Depletion Safety Device (ODSD) Sensing Burner - Indoor Model Only

The sensing burner is a primary air type ceramic burner that consists of an outer jacket surrounding the flame opening and a thermocouple to detect flame temperature. The sensing burner is located in the part of the main burner and designed to monitor the flame condition at all times. In case the oxygen level decreases due to blocked or clogged air intake or flue venting or by contaminated air (not enough oxygen content), location of the flame, as well as its temperature, will change. This change will be detected by the ODSD thermocouple.



The unit will attempt to resolve the problem on its own by adjusting the quantity of fuel and adjusting the fan speed. During this resolution period, the unit will show a flash code of 05 and have an audible alarm. In the event the unit cannot fix the fuel air mixture, the unit will shut down with a flash code of 13.

Here is how the ODS sensing system works.

1	Is the ODS thermocouple detecting normal temperatures?	Yes	Unit is operating normally. ODS Thermocouple will detect proper temperature with 2 minutes on a cold start and within 1 minute on a warm start.
	No		
2	Printed Circuit Board (PCB) will increase the airflow rate to balance the air-fuel mixture.		PCB automatically tries to fix the problem with increased airflow.
3	Is the ODS thermocouple detecting normal temperatures?	Yes	Unit is operating normally.

	No		
4	Second attempt by the PCB to increase the airflow rate to balance the air-fuel mixture.		PCB continues to try to fix the air-fuel mixture my adding airflow. It now adds a visual alarm on the Remote Control by flashing both the red and green indicators.
5	Is the ODS thermocouple detecting normal temperatures?	Yes	Unit is operating normally.
	No		
6	Third attempt by the PCB to increase the airflow rate to balance the air-fuel mixture.		PCB continues to try to fix the air-fuel mixture by adding airflow. It now adds an audible alarm on the Remote Control by sounding a tone every 60 seconds and flashes a monitor code of 05.
7	Is the ODS thermocouple detecting normal temperatures?	Yes	Unit is operating normally.
	No		
8	Final attempt by the PCB to increase the airflow rate to balance the air-fuel mixture.		If the unit does not detect normal ODS thermocouple temperatures, then unit will shut down with an error code of 13.

NOTE

Shutdown by imperfect combustion can be reset by pressing power switch (ON/OFF Button). If shutdown occurs 5 times within 4 hours, the water heater will not recover for the next 4 hours.

How to Reset the Four (4) Hour ODS Timer

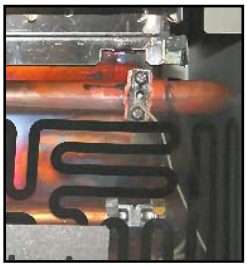
1. Turn the unit OFF. Remove the front cover. Locate the dip switches on the control board.
2. Make sure all the dip switches are OFF (down position).
3. Locate the #2 dip switch and turn it ON (up position) then immediately turn it off.
4. Within 5 seconds, press and hold both the MIN and MAX button for at least 2 seconds.
5. The remote control will flash briefly. This is your signal that the fault history has been cleared.
6. You can operate the machine.

Overheat Film Wrap

The Overheat Film Wrap detects the heat exchanger if and when it overheats. The over heat limiter is the plastic film wrap with the black squiggly lines.

It constantly monitors the heat exchanger temperature and will show an Error Code 14 in the event the heat exchanger gets too hot.

Heat Exchanger Thermistor



The Heat Exchanger Thermistor monitors the temperature of the water inside the heat exchanger. It will activate to Error Code 15 if the water temperature exceeds 207º F for more than 15 seconds; or 230º F for more than 1 second. It will also show an Error Code 32 if the thermistor is disconnected from the circuit board.

Maintenance Panel Display

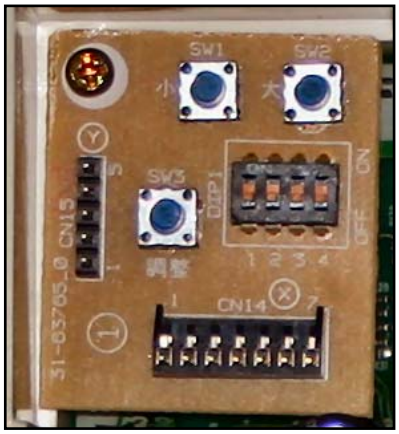
The Rheem Tankless has a Maintenance Display chart on the remote control panel. To access the Maintenance Display, turn the unit OFF. Then hold down the UP and DOWN arrow keys at the same time for a few seconds. You will hear an audible beep and see the display go to 0E. By pressing the UP and DOWN arrow keys on the remote display, you can access a variety of information about the machine. For Example a code at 3E (recent faults) may display as 21 (Error Code 21).

Shortcut: Lift dip switch #1 to the up position to go immediately into maintenance mode.

	First Digit – Use DOWN (▼)arrow key on Remote Control										
Second Digit – Use UP (▲) arrow key on Remote Control		0*	1*	2*	3*	4*	5*	6*	7*	8*	9*
	***E**	***Null***	***Fault Codes of the most recent 8 faults***								***Null***
	*F	Null	Sequence Number of the most recent 8 faults								Null
	*C		Total combustion times until recent error fault (** x 10000times)								Null
	*D		Total combustion times until recent error fault (** x 100 times)								Null
	*H		Total combustion period until recent error fault (** x 1000 hours)								Null
	*J		Total combustion period until recent error fault (** x 10 hours)								Null
	***Y**	***Flame Rod Status***	***GPM Flow Rate (*.* gpm)***	***Ambient Air Thermistor Temperature***	***Cold Water Inlet Thermistor Temperature***	***Heat Exchanger Thermistor Temperature***	***Hot Water Outlet Thermistor Temperature***	***Fan Speed x 100 RPM***	***Power for P.G.F.R. valve***	***Null***	***Null***
	*A	Thermo Electromotive Force	Control Line Voltage	Fan Detective Value	Fan Motor Current	Null	Null	Null	Null	Null	Sequence Number

You can turn the unit on while in Maintenance Mode by quickly pressing the ON/OFF button one time. The temperature will default to 120 degrees and will not display because you are still in Maintenance Mode. If you demand hot water, the unit will fire off and you will be able to read the "Y" line in real time. That means you will see the actual flow rate in gallons per minute, the cold-water inlet temperature, the hot water outlet temperature, heat exchanger temperature, and flame rod status.

Clearing the Fault History



1. Turn the unit OFF. Remove the front cover. Locate the dip switches on the control board.
2. Make sure all the dip switches are OFF (down position).
3. Locate the #1 dip switch and turn it ON; then turn it OFF.
4. Within 5 seconds of turning the dip switch off, press and hold the MIN (SW1) or MAX (SW2) button for at least 2 seconds.
5. The remote control will flash briefly. This is your signal that the fault history has been cleared.
6. You can verify clearing of fault history by entering Maintenance Mode and check the code at location 1E. It should read NULL or ⊓ .

Adjusting the Burner Control Assembly (Printed Circuit Board)

The purpose of this procedure is the balance the fuel pressure and air volume at the burner manifolds. This procedure will ensure that you get optimal performance of the modulating characteristics of the unit by allowing firing rates between 19,000 BTU (minimum) and 199,900 BTU (maximum).

WARNING: You will need to perform this procedure when you replace the PCB or install a new altitude chip. Without the adjustment, the water heater may not function properly.

When replacing the printed circuit boards adjust as follows.

Measurement of Fan Pressure:

Measure the fan pressure before adjusting the burner manifold pressure. The fan pressure differs depending on models, types of gas and installation condition. Measure the fan pressure at each installation site.

1. Measurement of "Minimum" Capacity
    a. Without opening the hot water tap, push the “SW1" Button on PC Board.
    b. Using the manometer, measure and record the pressure (in. w.c.).
2. Measurement of "Maximum" Capacity
    a. Without opening the hot water tap, push the "SW2" Button on PC Board.
    b. Using the manometer, measure and record the pressure (in. w.c.).

Adjustment of Burner Manifold Pressure:

NOTE: Always start from "Minimum" when adjusts the burner manifold pressure. The display is on remote control. Always connect the remote control to monitor this procedure.

1. Adjustment of "Minimum" capacity
    a. Open the hot water tap gradually until the water heater ignites at the minimum

operating water flow.

b. Push the Adjusting Button on the PC Board. **[LH]** is displayed on the LED of remote control.
c. Hold the Adjusting Button; push the "SW1" button on the PC Board. The current number [01 - 39] is displayed on the LED of remote control.

NOTE: Every time you press the MIN button, the display will cycle up to the number 39. Once it reaches 39, it will automatically reverse and cycle back down to 1.

d. You can change the gas pressure by pushing the "SW1" button. Using the manometer, adjust the minimum manifold pressure to the standard pressure plus the measured minimum fan pressure.
e. Release the "SW1" button.

2. Adjustment of "Maximum" capacity
   a. Open the hot water tap fully to allow the water heater to ignite a maximum operating flow. You may need to turn on up to three fixtures to get max water flow.
   b. Push the Adjusting Button on the PC Board. [LH] is displayed on the LED of remote control.
   c. Hold the Adjusting Button; push the "SW2" Button on the PC Board. The current figure [01 - 39] is displayed on the LED of remote control.
   d. You can change the test gas pressure by pushing the "SW2" button every time. Using the manometer, adjust the minimum manifold pressure to the standard pressure plus the measured maximum fan pressure.
   e. Release the "SW2" button.

Note: If [EE] is displayed on the LED of remote control, adjust again with caution. This means there was an error in the adjustment sequence.

How to Check Manifold Gas Pressure

When the “MAX” or “MIN” button is pushed, the combustion is fixed at the respective firing rate. The LED of remote control displays 1L (minimum combustion) or 3H (maximum combustion).

The adjusted manifold pressure must be as follows.

RTG74-Indoor	MAX. (in. w.c.)	MIN. (in. w.c.)
NAT. Gas	2.52+ fan pressure (max.)	0.45+ fan pressure (min.)
L.P. Gas	7.36+ fan pressure (max.)	1.22+ fan pressure (min.)

RTG74 -Outdoor	MAX. (in. w.c.)	MIN. (in. w.c.)
NAT. Gas	2.32+ fan pressure (max.)	0.43+ fan pressure (min.)
L.P. Gas	6.61+ fan pressure (max.)	1.10+ fan pressure(min.)

Second Generation Product Fan Speeds

42PVP 2nd	2.52 + fan pressure (max.)	0.45 + fan pressure (min.)
42PVN 2nd	2.36 + fan pressure (max.)	0.45 + fan pressure (min.)
53PVP	3.50 + fan pressure (max.)	0.45 + fan pressure (min.)
53PVN	3.46 + fan pressure (max.)	0.45 + fan pressure (min.)

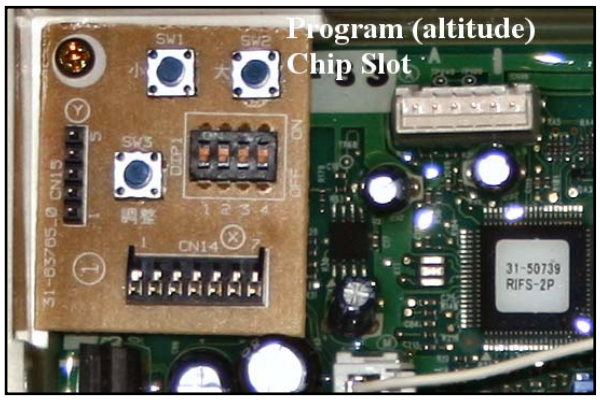
53XP	3.46 + fan pressure (max.)	0.55 + fan pressure (min.)
53XN	2.83 + fan pressure (max.)	0.49 + fan pressure (min.)
53DVP	3.01 + fan pressure (max.)	0.37 + fan pressure (min.)
53DVN	2.95 + fan pressure (max.)	0.39 + fan pressure (min.)
74DVP	7.28 + fan pressure (max.)	1.15 + fan pressure (min.)
74DVN	2.36	0.42 + fan pressure (min.)

Program Chip Adjustment

To quickly establish someone's altitude with zip code use the following link. Type the zip code in the upper left hand corner and hit enter, it will bring up current weather conditions and include the altitude.

http://www.wunderground.com/

When the water heater is installed above 3,280 feet, adjustment of the Program Chip is required. Without adjusting the Program Chip, the water heater may not function properly. If the water heater is installed less than 3,280 feet, no Program chip is required or supplied and no action is necessary. A different Program chip is required for every 3,280 feet. The Program chip is not interchangeable between Indoor and Outdoor models or types of gas.

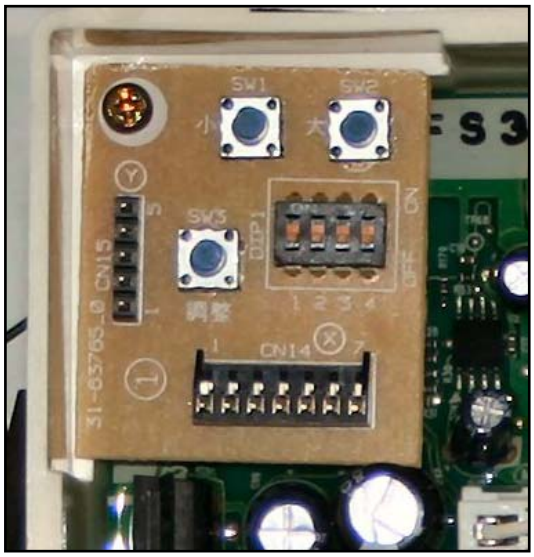


1. Check the altitude (above sea level) where the water heater is installed.
2. Ensure that you have the correct Program chip for proper model, gas type and altitude.
3. Disconnect the electric power to the water heater. Turn off the gas shutoff valve and water shutoff valve.
4. Remove the front cover.
5. Place Program Chip as shown on PCB.
6. Turn on the electric power.
7. Find the DIP Switch #1 and #2 located at the top left hand side of the PCB.
8. Change the DIP Switch #1 and #2 setting to the "ON" position. DO NOT alter any other DIP Switch.
9. The LED on the PCB is flashing. At the same time, the display of the remote control starts to flash.
10. Find the Adjusting Button located at the top left hand side of the PCB.
11. Press the Adjusting Button on the PCB. The display of the PCB and the remote control changes from "Flashing" to "Illuminating".
12. Change the Dip Switch #1 and #2 setting to the "OFF" position. DO NOT alter any other

DIP Switch. The LED on the PCB and the display of the remote control stops illuminating.
13. Attach the unit's front cover.
14. Turn on the gas shutoff valve and water shutoff valve.
15. Check and ensure safe operation and performance of the water heater.

Changing the Maximum Temperature Setting to 140°

By installing the UMC- Main Remote Control, you can adjust the maximum temperature setting to 140 degrees F. Water temperature settings of 130°F and 140°F can be achieved only when using MAIN remote control. The water temperature is set at 100°F from the factory.



To adjust the unit to create water temperatures from 130 or 140 degrees, you must perform a DIP Switch adjust as follows:

1. Turn off remote control. Leave the unit plugged into a 120 VAC power source.
2. Turn off the gas and water shutoff valves.
3. Remove the front cover.
4. Find the DIP Switch #4 located at the top left hand side of the PCB.
5. Change the DIP Switch #4 setting to the "ON" position. DO NOT alter any other DIP Switch.
6. The LED on the PCB is flashing. At the same time, the display of the Main Remote Control starts to flash.
7. Press the **"SW2"** Button on the left hand side of the PCB for more than 1 second.
8. The LED on the PCB starts illuminating continuously. At the same time, the display of the Main Remote Control is on continuously.
9. Change the DIP Switch #4 setting back to the "OFF" position. DO NOT alter any other DIP Switch.
10. The LED on the PCB will stop illuminating. At the same time, the display of the Main Remote Control will turn off.
11. Attach the unit's front cover.
12. Turn on the remote control, gas and water shutoff valves.
13. Check and ensure safe operation and performance of the water heater.

Changing the Maximum Temperature Setting to 120°

Follow the instruction below if it is determined that a setting of 130°F or 140°F is no longer required and you want to return to a maximum water temperature of 120°.

1. Turn off remote control. Leave the unit plugged into a 120 VAC power source.
2. Turn off the gas and water shutoff valves.
3. Remove the front cover.
4. Find the DIP Switch #4 located at the top left hand side of the PCB.
5. Change the DIP Switch #4 setting to the "ON" position. DO NOT alter any other DIP Switch. The LED on the PCB is on. At the same time, the display of the Main Remote Control is on continuously.
6. Press the **"SW1"** Button on the left hand side of the PCB for more than 1 second. The LED on the PCB starts flashing. At the same time, the display of the Main Remote Control starts to flash.
7. Change the DIP Switch #4 setting back to the "OFF" position. DO NOT alter any other DIP Switch. The LED on the PCB will stop flashing. At the same time, the display of the Main Remote Control will turn off.
8. Attach the unit's front cover.
9. Turn on the remote control, gas and water shutoff valves.
10. Check and ensure safe operation and performance of the water heater.

Error Codes

Code	Fault	Remedy
00	1 Hour continuous combustion (First generation products only – mfg date thru Jul 06)	Close all hot water taps to reset unit. Turn off, or remove circulation pumps (unit is not designed for continuous operation with circulation systems).
03	MIC 180 and EZ Link Only	Check communications cable. Check #4 dip switch setting to ON position.
05	Imperfect Combustion Alarm	Clean air inlet filter. Clean combustion air fan. Clean heat exchanger fins. Check for adequate combustion air ventilation openings and clean if necessary. Check vent system for partial blockage and correct as necessary.
10	*Warning or Predictive Code – not a fault code.* Air Supply or Exhaust Blockage	Check all vent components for proper connections. Check that nothing is blocking the flue inlet or exhaust. Ensure condensation trap/drain was installed correctly. Ensure heat exchanger fins, fan, and air intake are not blocked.
11	No Ignition	Ensure you have gas to the appliance and valves are turned ON. Ensure gas type and pressure is correct. Bleed all air from gas lines. Ensure gas line, meter, and regulator are sized properly. Ensure appliance is properly grounded. Check gas solenoid valves for open or short circuits. Ensure igniter is operational. Check igniter wiring harness for damage.
12	Flame Failure (had main burner, then lost it)	Ensure gas type and pressure is correct. Bleed all air from gas lines. Ensure flame rod wire is connected. Check flame rod for carbon build-up. Ensure gas line, meter, and regulator are sized properly.

		Ensure appliance is properly grounded. Check gas solenoid valves for open or short circuits. Check power supply for proper voltage and voltage drops. Disconnect remote control; see if it runs. Disconnect and re-connect all wiring harnesses on unit and PC board.
13	Oxygen Depletion Sensor (Poor or Improper Combustion)	Ensure there is plenty of fresh air to the unit. Unit needs 1 square inch for each 1,000 BTU of input. That is up to 200 square inches or a space 14 ½ x 14 ½ inches.
14	Overheat Wrap Fault	Ensure high fire and low fire manifold pressure is correct. Check gas type of unit and ensure it matches gas type being used. Check heat exchanger for cracks and/or separations. Check for improper program chip. Check for restrictions in airflow around unit and vent terminal.
15	Boiling Safety Device	Check for closed water heater inlet valve or restrictions in cold water inlet pipe (must be fully open). Check for clogged heat exchanger (scale buildup). On commercial water heater, lower set point temperature below 180^0F at high altitude.
16	Over Temperature Warning	Check for clogged heat exchanger. Check for restrictions in airflow around unit and vent terminal.
21	Malfunction of Air Intake Filter Switch (Indoor Products Only)	Make sure air filter door is properly seated. Make sure front panel is properly installed.
24	Malfunction of Operational Switch	Disconnect remote control and retry. Verify unit is electrically grounded. Press max button on PCB to reset; Press min button on PCB to reset.
29	Heat Exchanger Outlet Temp. Too Low	Clean air inlet screen. Clean heat exchanger fins
31	Water Inlet Temperature Sensor Fault	Check sensor wiring for damage. Ohm out sensor Check and clean scale from sensor.
32	Heat Exchanger Temperature Sensor Fault	Check sensor wiring for damage. Ohm out sensor Check and clean scale from sensor.
33	Outgoing Water Temperature Sensor Fault	Check sensor wiring for damage. Ohm out sensor Check and clean scale from sensor.
34	Combustion Air Temperature Sensor Fault	Check sensor wiring for damage; Ohm out sensor Check and clean ambient air temperature sensor. Ensure fan blade is tight on motor shaft and it is in good condition. Check for restrictions in airflow around unit and vent terminal.
35	Improper Thermistor Connection	Check that all thermistors are connected to proper connections on PCB.
38	ODS Sensor has malfunctioned.	The sensor itself is not responding to a self check from the printed circuit board. Check wiring harness. Check for proper voltage to ODS
51	Gas Inlet Solenoid Valve Fault	Check gas inlet solenoid valve wiring harness for loose or damaged terminals. Ohm out solenoid valve.

52	Modulating Solenoid Valve Fault	Check modulating gas solenoid valve wiring harness for loose or damaged terminals. Ohm out solenoid valve.
61	Combustion Fan Failure	Ensure fan motor will turn freely. Motor will operate with a small amount of restriction. Check wiring harness to motor for damaged and/or loose connections. Check venting length not to exceed max lengths and bends.
65	Water Volume Control Fault	Check water flow solenoid valve wiring harness for loose or damaged terminals. Check for proper voltage to water flow solenoid.
66	Water By-Pass Control Fault	Check water by-pass solenoid valve wiring harness for loose or damaged terminals. Check for proper voltage to water by-pass solenoid
71	Gas Inlet Solenoid Valve Control Fault	Check gas inlet solenoid valve wiring harness for loose or damaged terminals. Ohm out solenoid valve.
72	Flame Sensing Device Fault	Ensure flame rod is touching flame when unit fires. Check inside burner chamber for any foreign material blocking flame at flame rod. Check all wiring to flame rod for damage. Check flame rod for proper voltage. Remove flame rod and check, clean with steel wool.
76	Communication Fault with Remote Control	Check remote control wiring for loose or damaged connections. Bypass remote control cable by connecting remote control directly to remote control terminals on PCB. Replace cable if found to be faulty.
79	Fan Motor Current Fault	Ensure fan motor will turn freely. Motor will operate with a small amount of restriction. Check fan motor for proper voltage and for water (condensation) damage
80, 81	Gas Cut-off Failure	Ohm out all solenoid valves. Check voltage of all flame rods.
82	PCB data failure. Control board is not programmed.	Program PCB for proper altitude and fuel type circuit board with proper programming chip.
90	Blocked Flue Fault	Clean any blockage in heat exchanger, combustion fan, inlet filter, and exhaust flue.
99	Fan Motor cannot vent	Clean Air Inlet Screen; Clear vent blockages Check for blocked heat exchanger
No code	Nothing happens when water is flowing through unit.	Make sure unit is connected to proper power supply and circuit breakers are on. Clean inlet water supply filter. Ensure you have at least the minimum flow rate required to fire unit. On new installations ensure hot and cold water lines are not crossed.

Diagnostic Points on Printed Circuit Board

Measurement Point		Normal Value	What you are checking?
Connection	**Wire Color**		
I – J		AC 90 – 110V	Do you have power to the control board?
U	W1 – W2	50K Ω – 500K Ω	Is the Over Heat Film Wrap OK?
S	BR1 – BK2	DC 2 - 5V (pulse) More than 1,310 pulses/minute is nominal.	Does the water flow sensor send a pulse? (Only when water is flowing thru control)
	R3 – BK2	DC 11 – 17 V	Does the water flow sensor have voltage? (Power ON; no water flow)
G	B4 – W6	DC 120 – 160 V	Does the fan motor have the proper voltage?
	R3 – B4	DC 12 - 18 V	Does the fan motor have proper voltage?
	Y1 – B4	DC 4 – 10 (Pulse)	Is the fan motor producing a regular pulse?
R	W6 – BK3	68^0F = @ 10.3 KΩ	Is the cold water inlet thermistor working?
R	Y5 – BK3	104^0F = @ 4.9 KΩ	Is the heat exchanger thermistor working?
R	R4 – BK3	104^0F = @ 4.9 KΩ	Is the hot water outlet thermistor working?
R	B7 – BK3	68^0F = @ 10.3 KΩ	Is the ambient air thermistor working?
R	R1 – BK2	DC 1.5 - 14 V 40 – 80Ω	Is the P.G.F.R. valve operating? (Proportional Gas Flow Regulating Valve)
L	R1 – GND	AC 1 – 100 V	Are the three flame rods detecting flame?
M	W1 – GND	AC 1– 100 V	
T	B1 – GND	AC 1 – 100 V	
Flame Rod 1 is the white wire and goes to the right front half burner. Flame Rod 2 is the red wire and goes to the right rear half burner. Flame Rod 3 is the blue wire and goes to the left burner. (74 series only)			
H	GY2 – GY5	AC 90 - 110 V	Is the igniter working properly
All models except RTG66: These are the two green wires at connector H. They are the two green wires to the by by-pass solenoid on the water flow valve. When the cold water bypass solenoid is closed, must be 0 volts DC. (Remote set at 118F ~ 180F). When the cold water bypass opens, voltage reads about 80 volts DC. (Remote is set to 100F~116F).			
K	Y1- BK5	DC 75 - 100 V .8 – 2.2. KΩ	Is the solenoid (SV0) working? (Primary fuel inlet to gas valve)
K	W2- BK5	DC 75 - 100 V .8 – 2.2. KΩ	Is the solenoid valve (SV1) working? (Fuel to ODS and front right burner)
K	R3- BK5	DC 75 - 100 V .8 – 2.2. KΩ	Is the solenoid valve (SV2) working? (Fuel to back right burner)
K	B4- BK5	DC 75 - 100 V .8 – 2.2. KΩ	Is the solenoid valve (SV3) working? (Fuel to left side burner)
B	W2 – BK8	DC 8 – 16V	Does the water volume control motor have proper voltage?
	R7 – BK8	DC 8 – 16V	Does the water volume control motor have proper voltage?
	GR6 – BK8	Less than 1V DC (Limiter on) DC4 – 6 V (Limiter Off)	Is the water volume control switch OK?

Q	R1 – W2	DC8 – 30V (measured 2 minutes after combustion startup)	Is the thermo-electromotive force OK?
P	1 – 2	DC8 – 30V (measured 2 minutes after combustion startup)	
O	W1 – W2	Less than 1V DC; Less than 1Ω	Is the air intake switch working?

Thermistor Resistance Chart

Temp °F	Resistance KΩ		Temp °F	Resistance KΩ		Temp °F	Resistance KΩ		Temp °F	Resistance KΩ
32	23.73		77	8.494		122	3.485		167	1.598
33.8	22.706		78.8	8.177		123.8	3.371		168.8	1.552
35.6	21.733		80.6	7.873		125.6	3.262		170.6	1.508
37.4	20.806		82.4	7.583		127.4	3.156		172.4	1.465
39.2	19.925		84.2	7.304		129.2	3.055		174.2	1.424
41	19.085		86	7.037		131	2.957		176	1.384
42.8	18.286		87.8	6.781		132.8	2.863		177.8	1.345
44.6	17.525		89.6	6.536		134.6	2.773		179.6	1.307
46.4	16.799		91.4	6.302		136.4	2.686		181.4	1.271
48.2	16.108		93.2	6.076		138.2	2.602		183.2	1.236
50	15.449		95	5.86		140	2.52		185	1.202
51.8	14.82		96.8	5.653		141.8	2.442		186.8	1.169
53.6	14.221		98.6	5.454		143.6	2.367		188.6	1.137
55.4	13.469		100.4	5.264		145.4	2.295		190.4	1.106
57.2	13.104		102.2	5.081		147.2	2.225		192.2	1.077
59	12.583		104	4.905		149	2.157		194	1.048
60.8	12.086		105.8	4.736		150.8	2.092		195.8	1.02
62.6	11.611		107.6	4.574		152.6	2.029		197.6	0.993
64.4	11.157		109.4	4.418		154.4	1.968		199.4	0.966
66.2	10.723		111.2	4.269		156.2	1.91		201.2	0.941
68	10.309		113	4.125		158	1.853		203	0.916
69.8	9.913		114.8	3.987		159.8	1.799		204.8	0.893
71.6	9.534		116.6	3.854		161.6	1.746		206.6	0.869
73.4	9.172		118.4	3.726		163.4	1.695		208.4	0.847
75.2	8.826		120.2	3.603		165.2	1.646		210.2	0.825

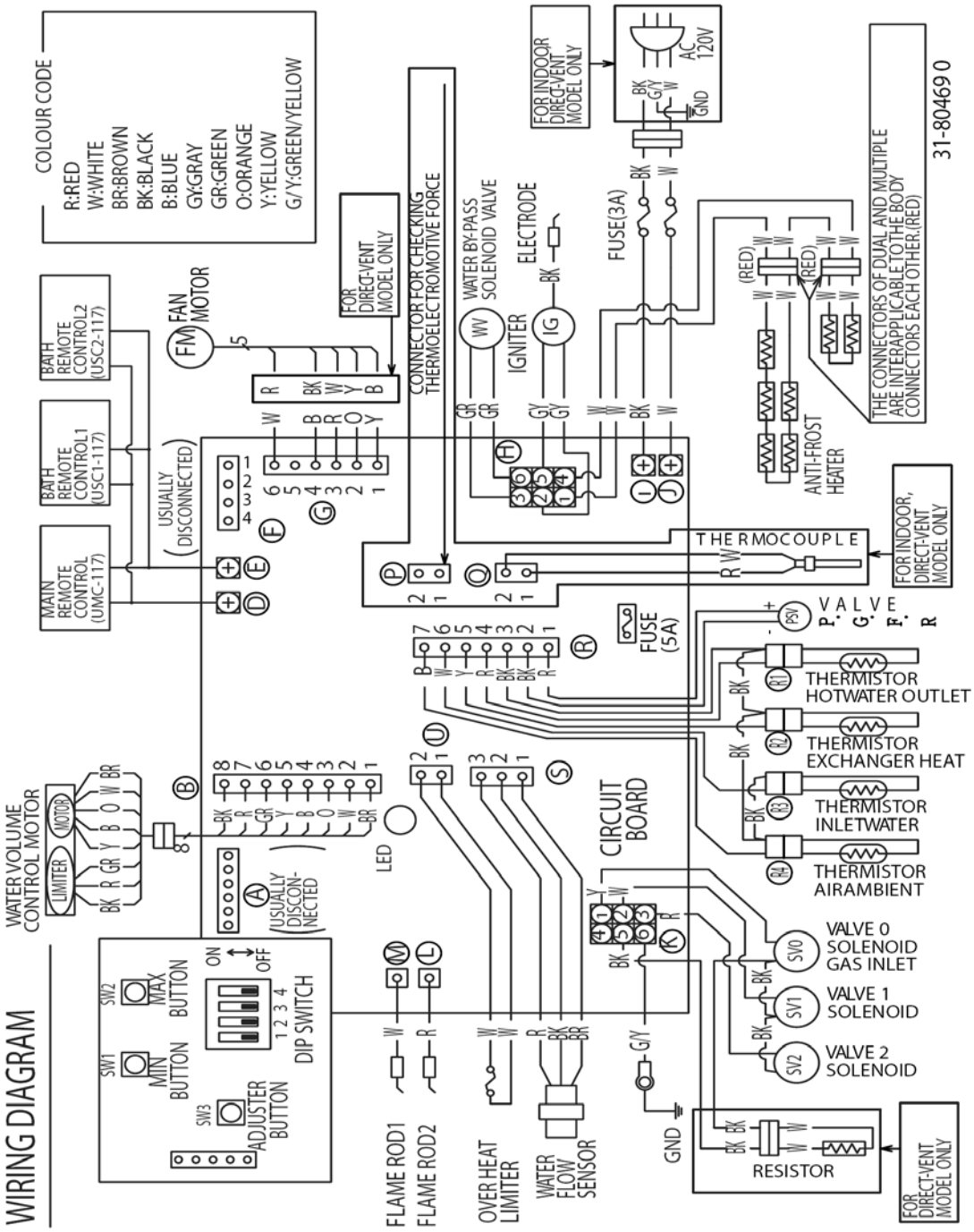
Fan Speed Chart

	Sea Level		3281 ~ 6560Ft		6561 ~ 9840	
Product Name	MIN	MAX	MIN	MAX	MIN	MAX
42PVN	3700	5850	3900	6200	4100	6550
42PVP	3600	5650	3800	6150	4000	6500
2-42PVN	3600	6100	3850	6551	4150	7034
2-42PVP	3500	6300	3800	6866	4150	7508
53PVN	3700	7100	3850	7550	4150	8100
53PVP	3500	7400	3800	8000	4150	8750
53XN	3300	6200	3600	6950	3850	7450
53XP	2650	6500	2950	7250	3250	7950
53DVN	2600	6500	2626	6850	N/A	N/A
53DVP	2400	6100	2600	6600	N/A	N/A
74PVN	3700	6400	3900	6800	4100	7200
74PVP	3700	6600	3900	7000	4100	7400
74PVN-1	3700	6400	3700	6400	3700	6400
74PVP-1	3700	6600	3700	6600	3700	6600
74PVN-2	3700	6400	3900	6800	4100	7200
74PVP-2	3700	6600	3900	7000	4100	7400
74XN	2700	6700	2900	7100	3100	7500
74XP	2800	6600	3000	7000	3200	7400
74XN-1	2700	6700	2900	7100	3100	7500
74XP-1	2800	6600	3000	7000	3200	7400
74XN-2	2700	6700	2900	7100	3100	7500
74XP-2	2800	6600	3000	7000	3200	7400
74DVN	2700	6050	2819	6250	2984	6650
74DVP	2630	6400	2768	6800	2932	7300
74DVN-1	2700	6050	2819	6250	2984	6650
74DVP-1	2630	6400	2768	6800	2932	7300
74DVN-2	2700	6050	2819	6250	2984	6650
74DVP-2	2630	6400	2768	6800	2932	7300

	Sea Level		3281 ~ 6560Ft		6561 ~ 9840	
Product Name	MIN	MAX	MIN	MAX	MIN	MAX
199PVN	3700	6400	3900	6800	4100	7200
199PVP	3700	6600	3900	7000	4100	7400
199PVN-1	3700	6400	3900	7000	4100	7200
199PVP-1	3700	6600	3900	7000	4100	7400
199PVN-2	3700	6400	3900	6800	4100	7200
199PVP-2	3700	6600	3900	7000	4100	7400
199XN	2700	6700	2900	7100	3100	7500
199XP	2800	6600	3000	7000	3200	7400
199XN-1	2700	6700	2900	7100	3100	7500
199XP-1	2800	6600	3000	7000	3200	7400
199XN-2	2700	6700	2900	7100	3100	7500
199XP-2	2800	6600	3000	7000	3200	7400
199DVN	2713	6050	2819	6250	2984	6650
199DVP	2608	6400	2768	6800	2932	7300
199DVN-1	2713	6050	2819	6250	2984	6650
199DVP-1	2608	6400	2768	6800	2932	7300
199DVN-2	2713	6050	2819	6250	2984	6650
199DVP-2	2608	6400	2768	6800	2932	7300

RTG2-42

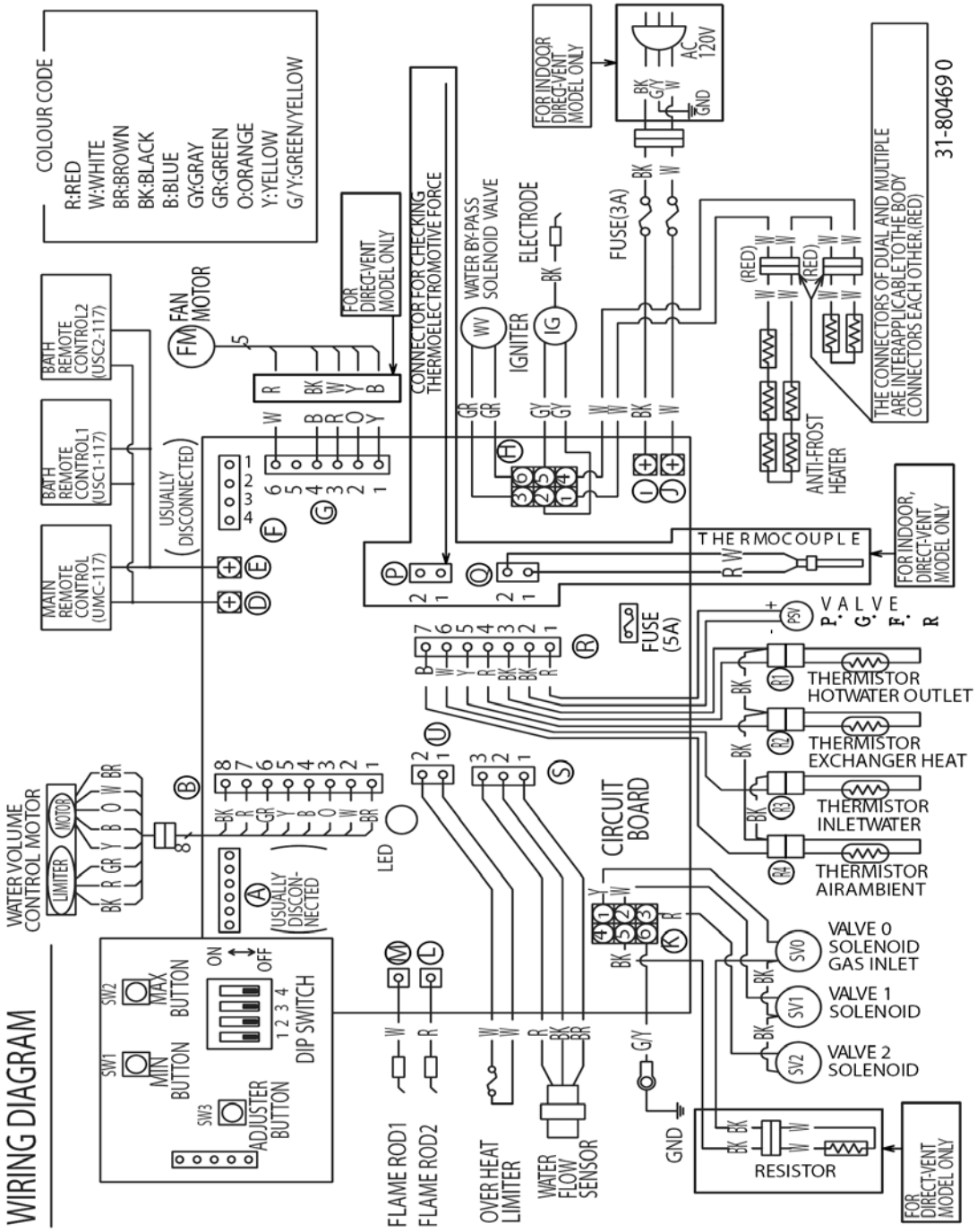
Wiring Diagram



Printed Circuit Board

RTG 53

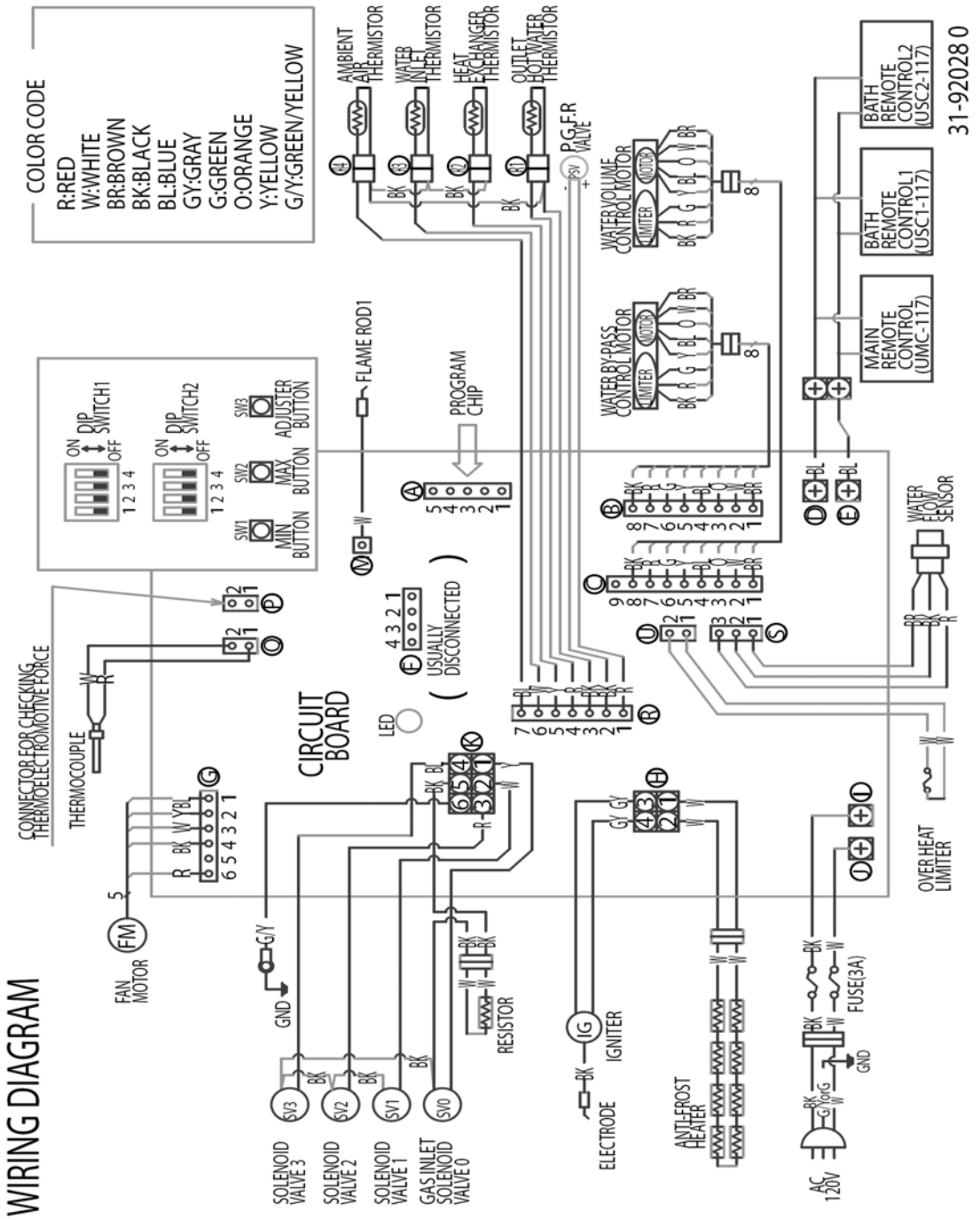
Wiring Diagram – RTG 53



Printed Circuit Board – RTG 53

RTG 66

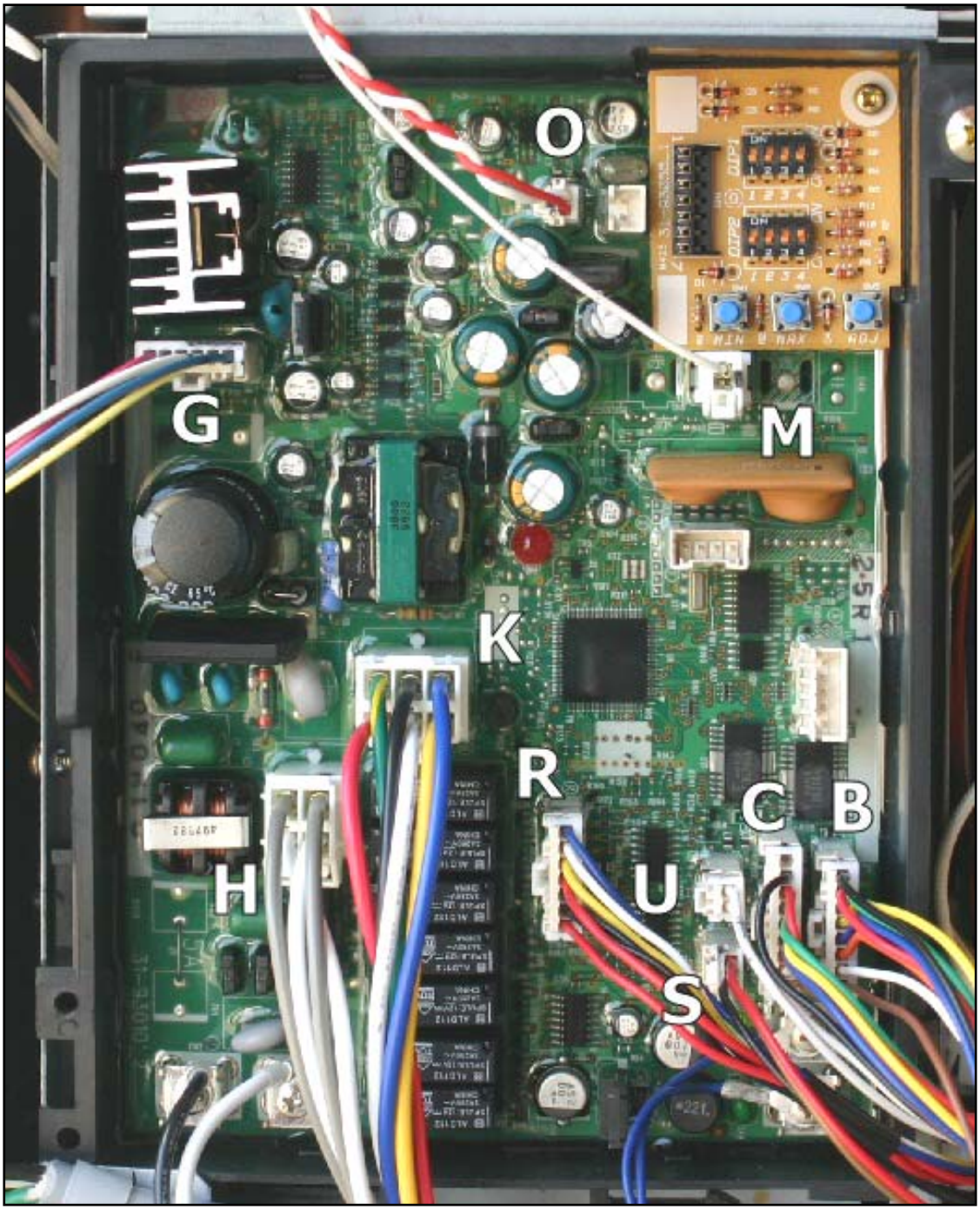
Wiring Diagram



Printed Circuit Board

The RTG 66 PCB has two set of dip switches. Dip Switch set #2 controls the high altitude settings. See the use and care manual for instructions.

The procedures for changing the maximum temperature set point have also changed. See the use and care manual for instructions.

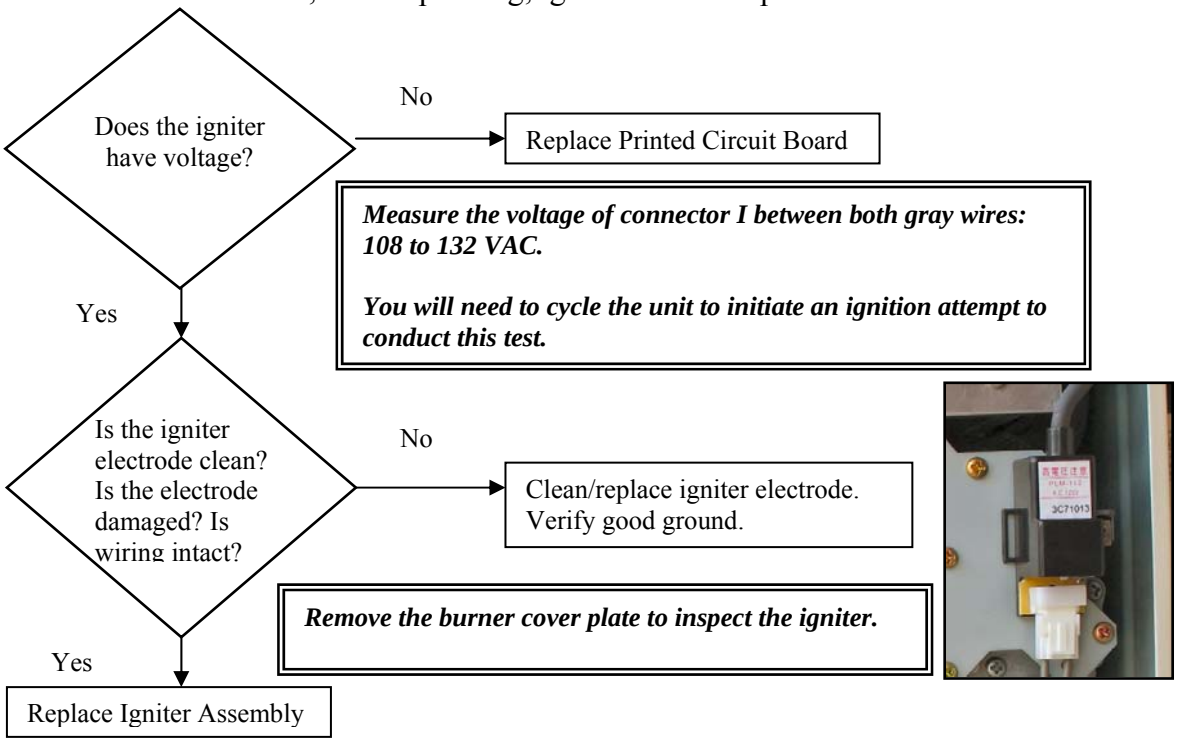


Error Code 11 (RTG66 Only)

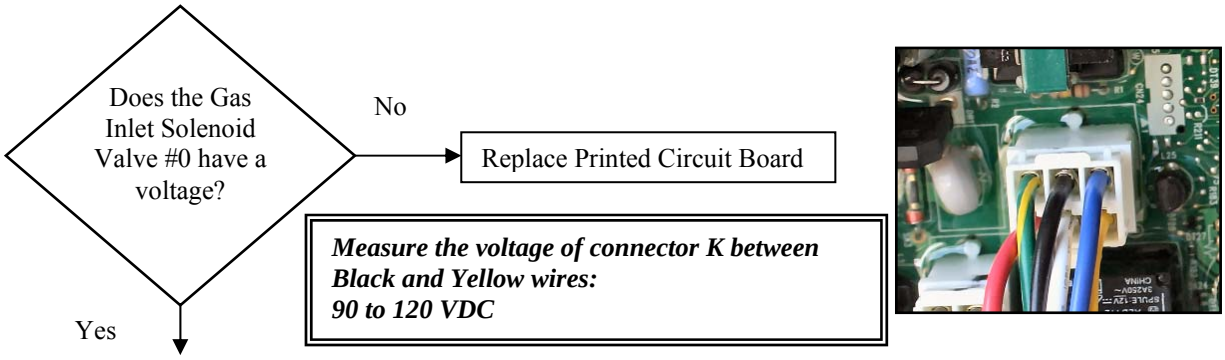
Explanation: No ignition. This error code can be cause one three different scenarios. Please match the scenario to the fault condition before you troubleshoot. At a minimum check the following in all cases:

1. Ensure you have gas to the appliance.
2. Bleed all air from gas lines.
3. Ensure appliance is properly grounded.
4. Ensure gas line, meter, and regulator are sized properly.
5. Ensure gas type and gas pressure to the machine is correct.
6. Flex lines with a full 3/4 inch inside diameter may also restrict fuel flow enough to give you error code 11. We do not condone the use of flex line gas piping with tankless.

Scenario 1 – Error Code 11; fan is operating; igniter does not spark.


Does the igniter have voltage?
No
Replace Printed Circuit Board
Measure the voltage of connector I between both gray wires: 108 to 132 VAC.
You will need to cycle the unit to initiate an ignition attempt to conduct this test.
Yes
Is the igniter electrode clean? Is the electrode damaged? Is wiring intact?
No
Clean/replace igniter electrode. Verify good ground.
Remove the burner cover plate to inspect the igniter.
Yes
Replace Igniter Assembly

Scenario 2 – Error Code 11; fan is operating; igniter does spark; main burner does not ignite.


Does the Gas Inlet Solenoid Valve #0 have a voltage?
No
Replace Printed Circuit Board
Measure the voltage of connector K between Black and Yellow wires:
90 to 120 VDC
Yes

Does the Solenoid Valve #1 have a voltage?

No → Replace Printed Circuit Board

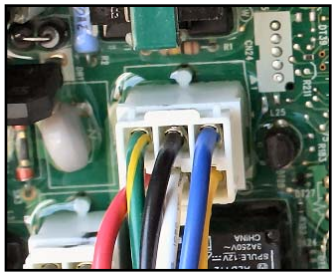
Measure the voltage of connector K between Black and White wires: 90 to 120 VDC

Yes

Does the Solenoid Valve #2 have a voltage?

No → Replace Printed Circuit Board

Measure the voltage of connector K between Black and Red wires: 90 to 120 VDC



Yes

Does the Solenoid Valve #3 have a voltage?

No → Replace Printed Circuit Board

Measure the voltage of connector K between Black and Blue wires: 90 to 120 VDC

Yes

Does the P.G.F.R. valve have a voltage?

No → Replace Printed Circuit Board

Measure the voltage of connector R between Black#2 and Red#1 wires: 1.5 to 14 VDC

Yes

Is the resistance of the Gas Inlet Solenoid Valve OK?

No → Replace Gas Control Assy

Measure the resistance of connector K between Black and Yellow wires: 0.8 to 2.4k Ohms

Yes

Is the resistance of the Solenoid Valve #1 OK?

No → Replace Gas Control Assy

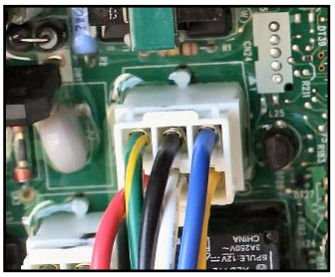
Measure the resistance of connector K between Black and White wires: 0.8 to 2.4k Ohms

Yes

Is the resistance of the Solenoid Valve #2 OK?

No → Replace Gas Control Assy

Measure the resistance of connector K between Black and Red wires: 0.8 to 2.4k Ohms



Yes

Is the resistance of the Solenoid Valve #3 OK?

No → Replace Gas Control Assy

Measure the resistance of connector K between Black and Blue wires: 0.8 to 2.4k Ohms

Yes

Is the resistance of the Proportional Gas Control Valve OK?

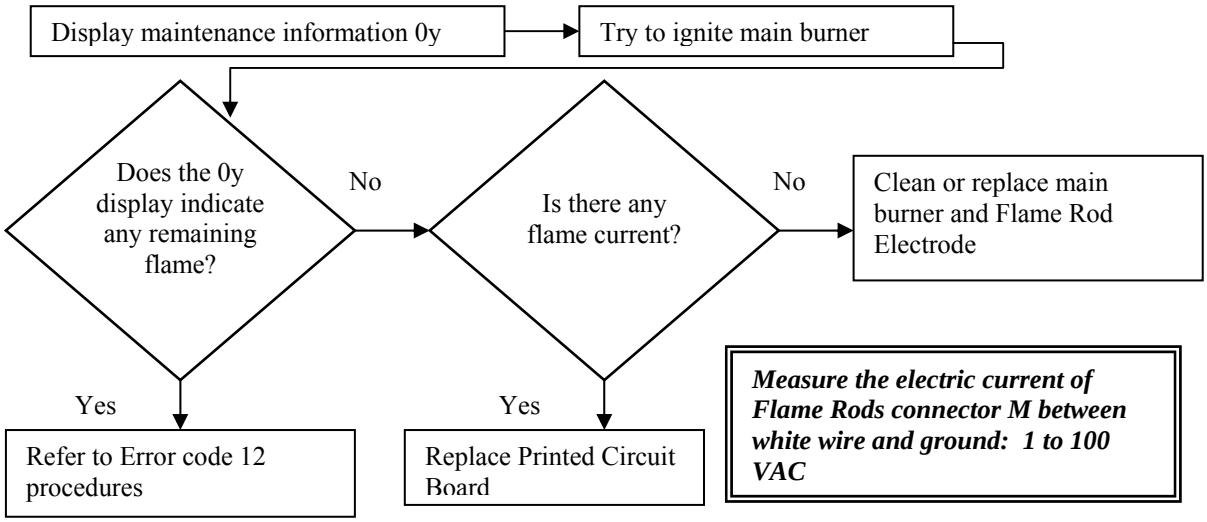
No → Replace Gas Control Assy

Measure the resistance of connector R between Black#2 and Red#1 wires: 40 to 80 Ohms

Yes

Check or replace main burner

Scenario 3 – Error Code 11; main burner ignites, but shuts off after ignition.


Display maintenance information 0y
Try to ignite main burner
Does the 0y display indicate any remaining flame?
No
Is there any flame current?
No
Clean or replace main burner and Flame Rod Electrode
Yes
Yes
Refer to Error code 12 procedures
Replace Printed Circuit Board
Measure the electric current of Flame Rods connector M between white wire and ground: 1 to 100 VAC

Flame Rod Status: X=not detecting flame; O=is detecting flame

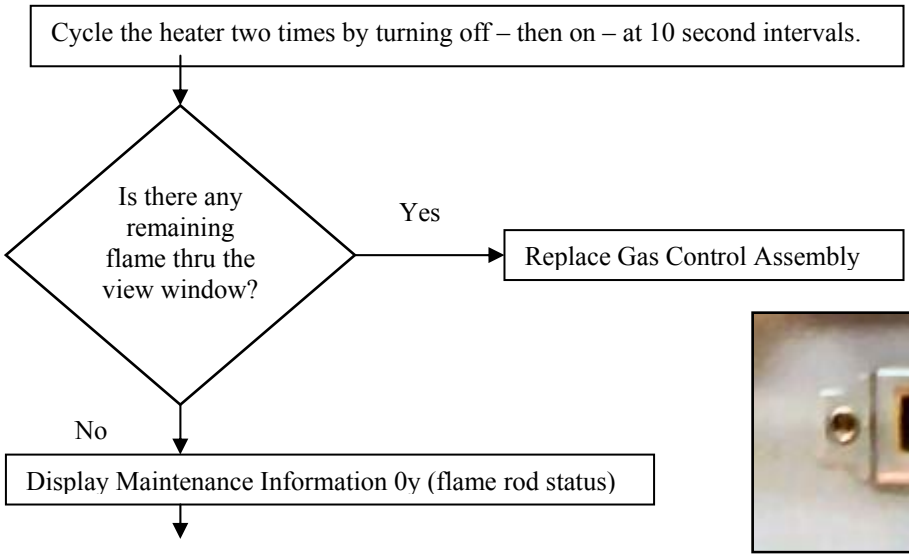
0y display	*00*	*01*
Flame Rod 1(white)	***X***	***O***

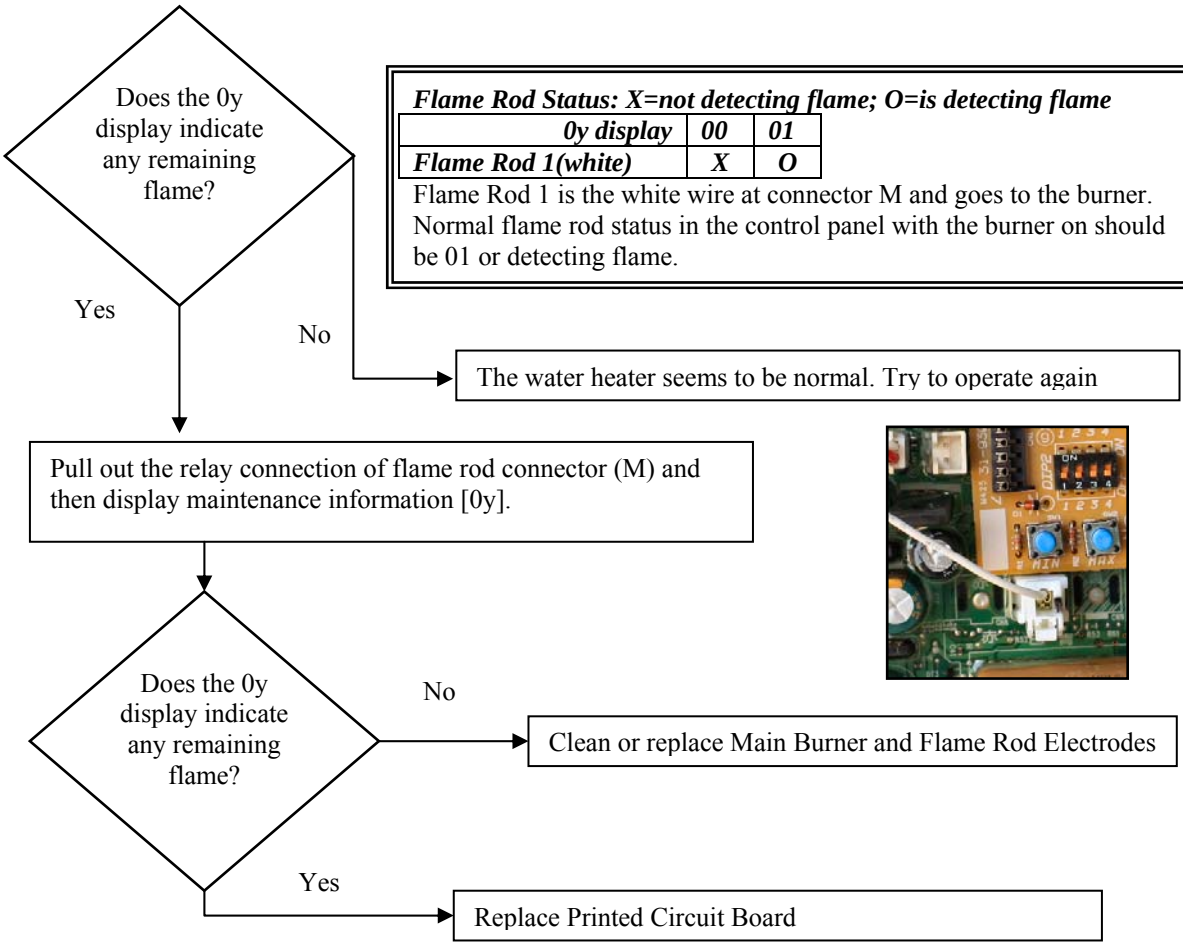
Flame Rod 1 is the white wire at connector M and goes to the burner.
Normal flame rod status in the control panel with the burner on should be 01 or detecting flame.

Error Code 51 (RTG 66 Only)

Explanation: Gas Inlet Solenoid Valve fault. At a minimum check the following:

1. Check gas valve wiring harnesses for loose or damage terminals
2. Check connections to the circuit board are tight.

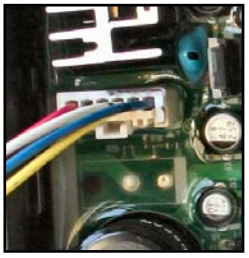

Cycle the heater two times by turning off – then on – at 10 second intervals.
Is there any remaining flame thru the view window?
Yes
Replace Gas Control Assembly
No
Display Maintenance Information 0y (flame rod status)

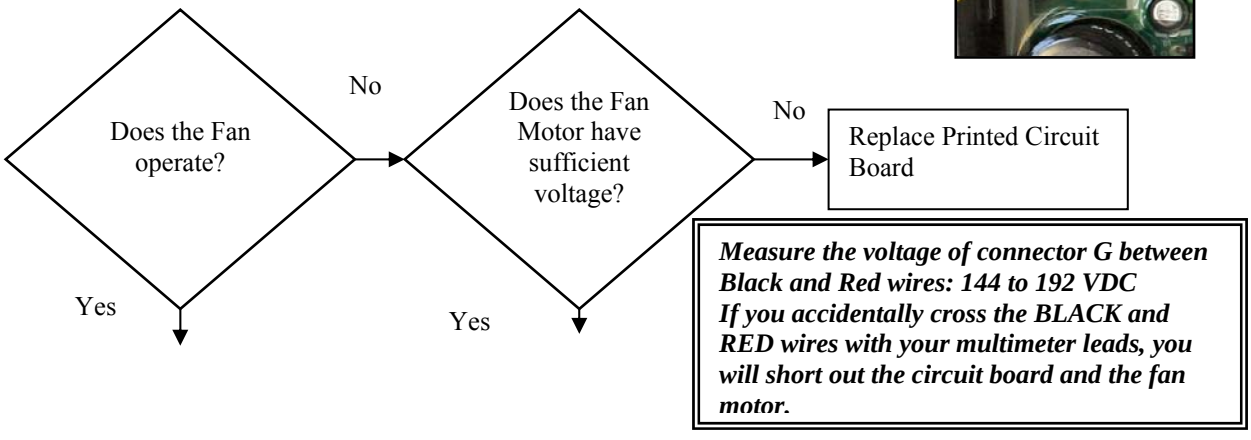

Does the 0y display indicate any remaining flame?
Yes
No
Flame Rod Status: X=not detecting flame; O=is detecting flame
0y display | 00 | 01
Flame Rod 1(white) | X | O
Flame Rod 1 is the white wire at connector M and goes to the burner. Normal flame rod status in the control panel with the burner on should be 01 or detecting flame.
The water heater seems to be normal. Try to operate again
Pull out the relay connection of flame rod connector (M) and then display maintenance information [0y].
Does the 0y display indicate any remaining flame?
No
Clean or replace Main Burner and Flame Rod Electrodes
Yes
Replace Printed Circuit Board

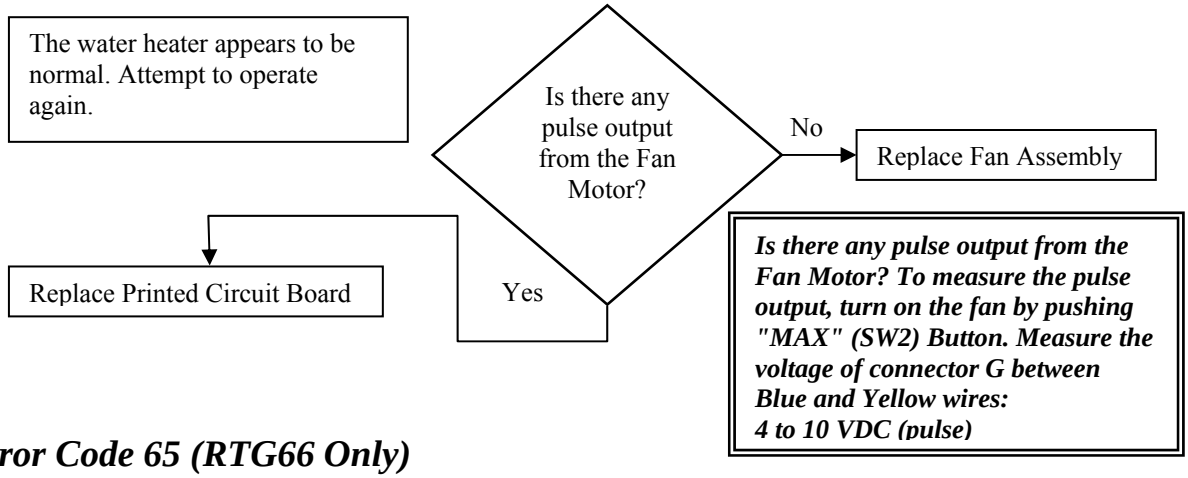
Error Code 61 (RTG 66 Only)

Explanation: Combustion Fan failure. Fan motor does not work properly. At a minimum check the following:

1. Ensure fan motor will turn freely.
2. Check if there is some volume of air from the flue outlet at the top of the heater.
3. Check wiring harness to motor for damaged and/or loose connections.
4. Check Molex connection of the PCB.



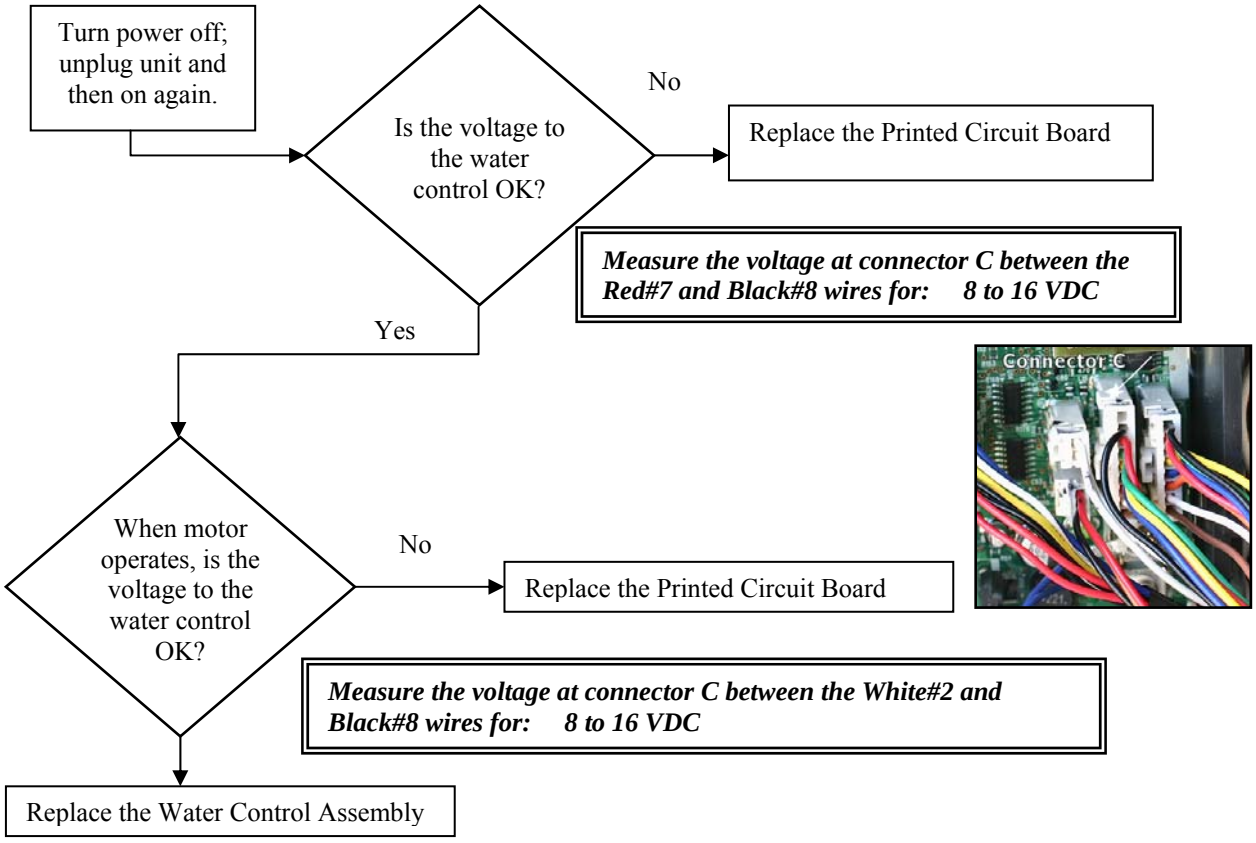

Does the Fan operate?
No
Does the Fan Motor have sufficient voltage?
No
Replace Printed Circuit Board
Yes
Yes
Measure the voltage of connector G between Black and Red wires: 144 to 192 VDC
If you accidentally cross the BLACK and RED wires with your multimeter leads, you will short out the circuit board and the fan motor.


The water heater appears to be normal. Attempt to operate again.
Is there any pulse output from the Fan Motor?
No
Replace Fan Assembly
Replace Printed Circuit Board
Yes
Is there any pulse output from the Fan Motor? To measure the pulse output, turn on the fan by pushing "MAX" (SW2) Button. Measure the voltage of connector G between Blue and Yellow wires:
4 to 10 VDC (pulse)

Error Code 65 (RTG66 Only)

Explanation: Water Volume Control fault. At a minimum check the following:

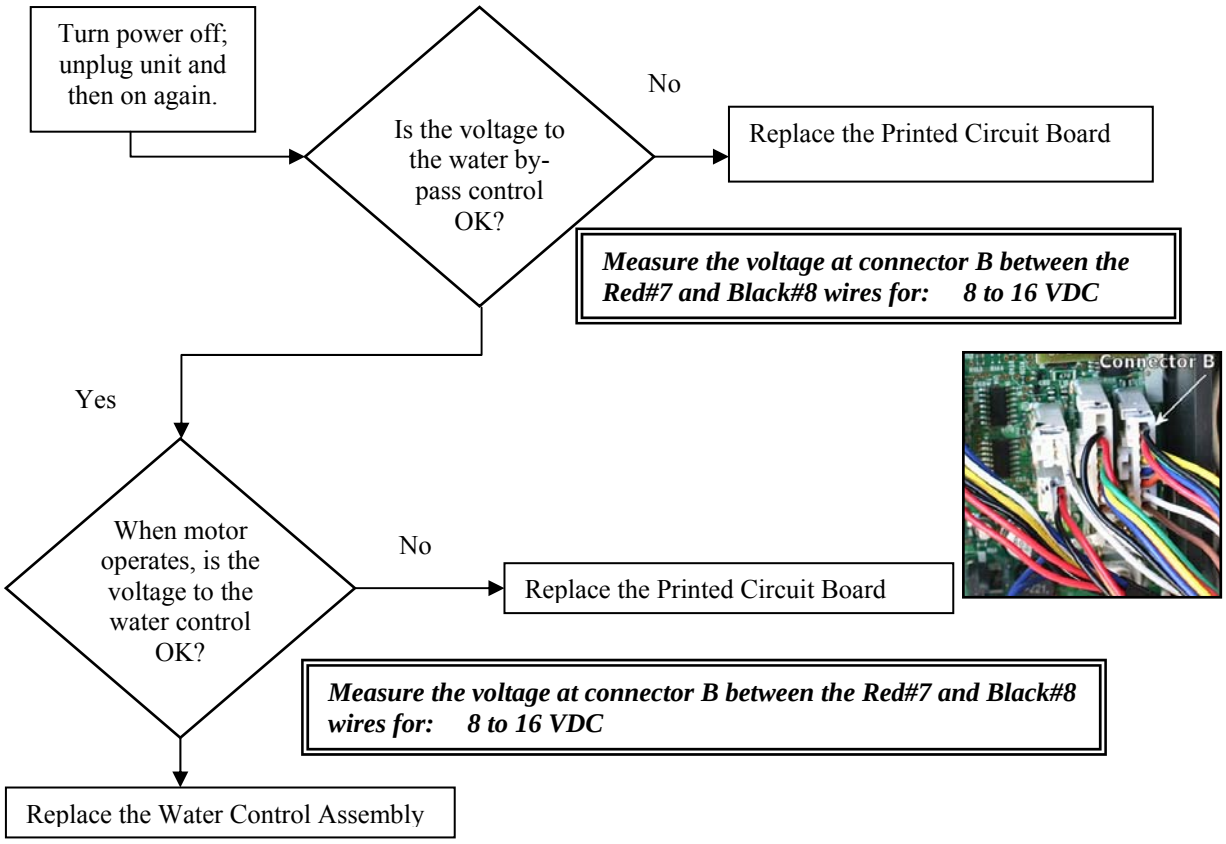
1. Verify there is water flow thru the unit even if the unit does not fire.
2. Access maintenance information to determine flow rate.
3. Check all wiring connections to the water control and connector B on the Printed Circuit Board.


Turn power off; unplug unit and then on again.
Is the voltage to the water control OK?
No
Replace the Printed Circuit Board
Measure the voltage at connector C between the Red#7 and Black#8 wires for: 8 to 16 VDC
Yes
Connector C
When motor operates, is the voltage to the water control OK?
No
Replace the Printed Circuit Board
Measure the voltage at connector C between the White#2 and Black#8 wires for: 8 to 16 VDC
Replace the Water Control Assembly

Error Code 66 (RTG66 Only)

Explanation: Water By-Pass Control fault. At a minimum check the following:

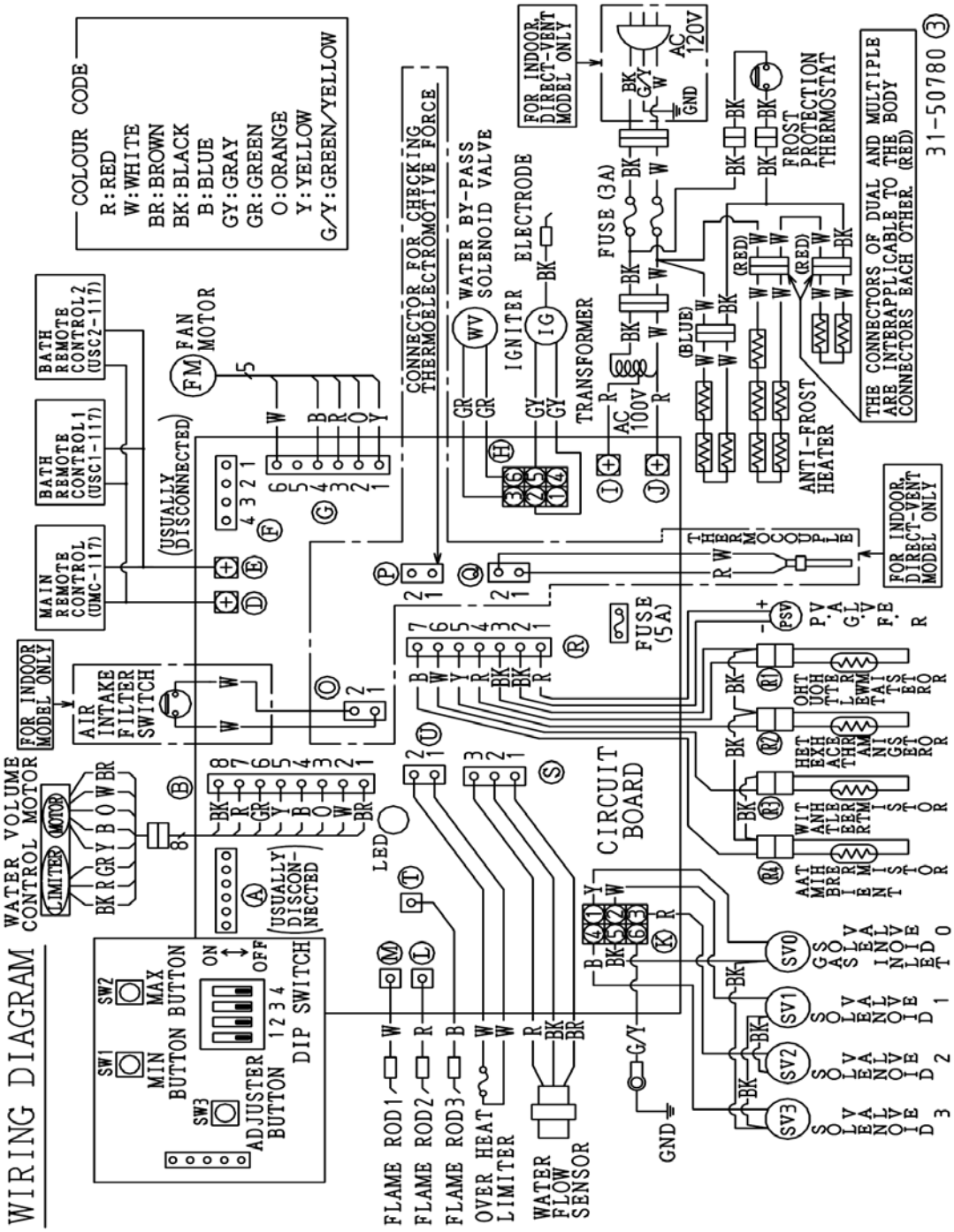
1. Verify there is water flow thru the unit even if the unit does not fire.
2. Access maintenance information to determine flow rate.
3. Check all wiring connections to the water control and connector B on the Printed Circuit Board.


Turn power off; unplug unit and then on again.
Is the voltage to the water by-pass control OK?
No
Replace the Printed Circuit Board
Measure the voltage at connector B between the Red#7 and Black#8 wires for: 8 to 16 VDC
Yes
When motor operates, is the voltage to the water control OK?
No
Replace the Printed Circuit Board
Measure the voltage at connector B between the Red#7 and Black#8 wires for: 8 to 16 VDC
Replace the Water Control Assembly
Connector B

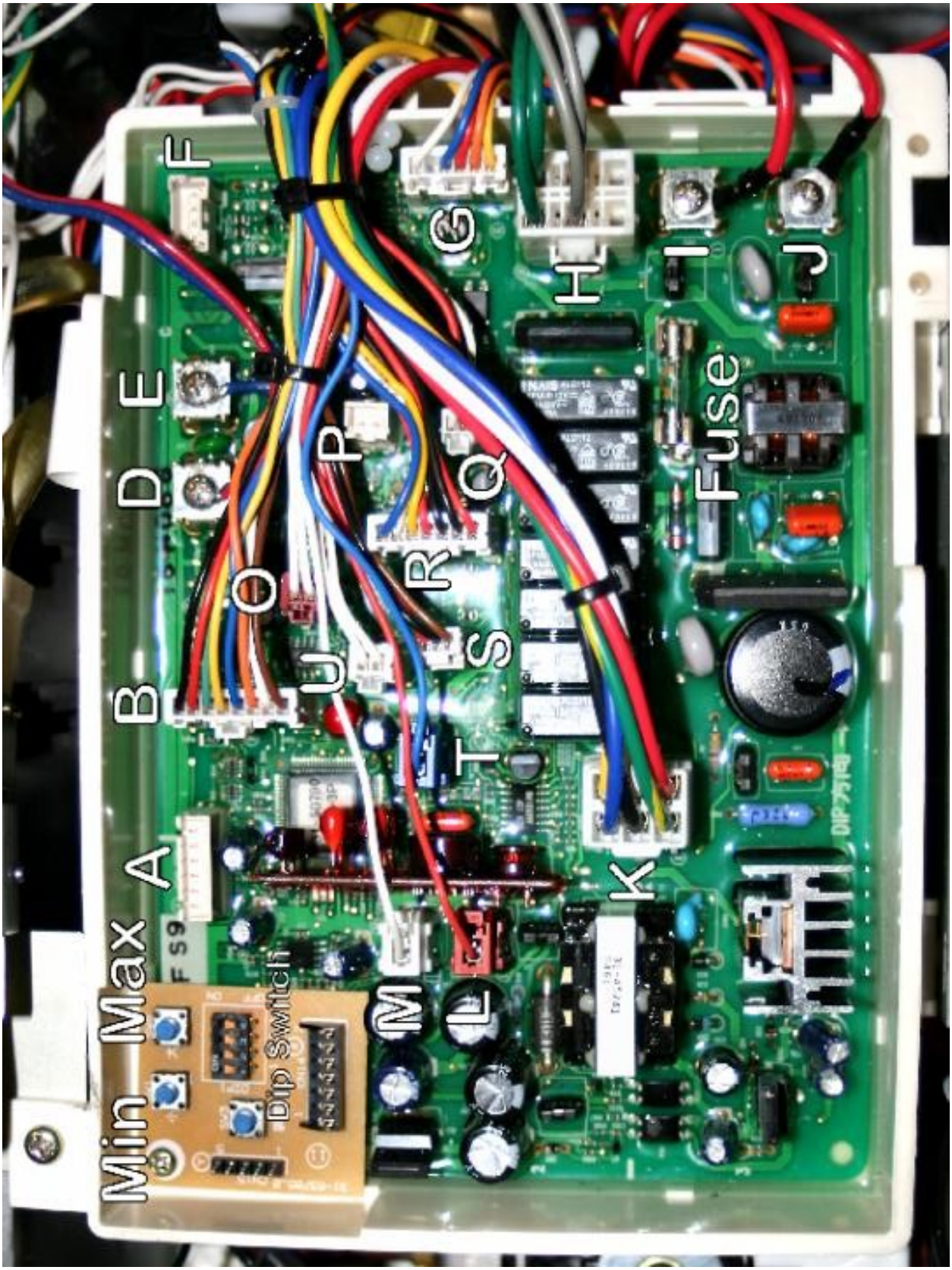
RTG 74

Wiring Diagram – RTG 74

A wiring diagram is also located on the inside of the front cover panel.



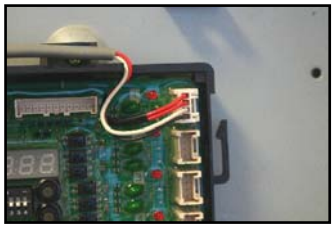
Printed Circuit Board – RTG 74



MIC-180 & EZ Link

There are two kinds of communications cables when manifolding multiple tankless units. If only two like units are connected together, we call that EZ Link. This process uses a single 6 foot long cable with four colored wires at each end. You can recognize the EZ Link cable by the yellow wire at each end. These cables may be plugged in either way.

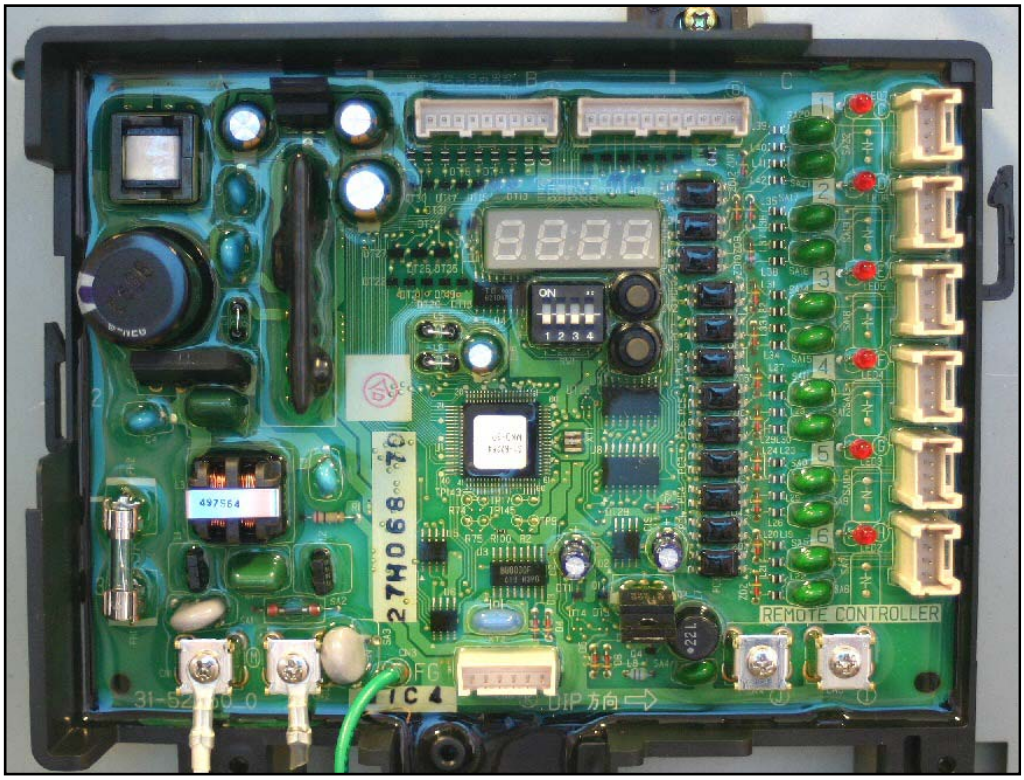
The other manifolding process uses the MIC-180 control panel to connect up to 20 tankless units at a time. These communications cables come in multiple lengths and have one end of the cable with a single red, white and black wire. These cables must be plugged in a certain way for the system to communicate properly. Plug the 3-wire end into the tankless water heater; plug the other (4-wire) end into the MIC-180 control board.



MIC-180 board

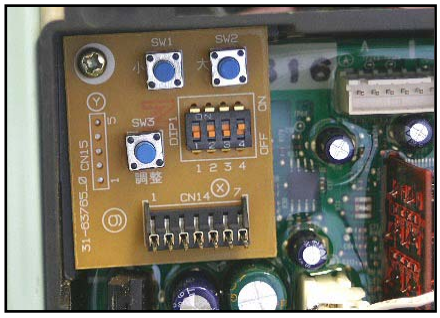
Tankless heater board

MIC-180 Printed Circuit Board



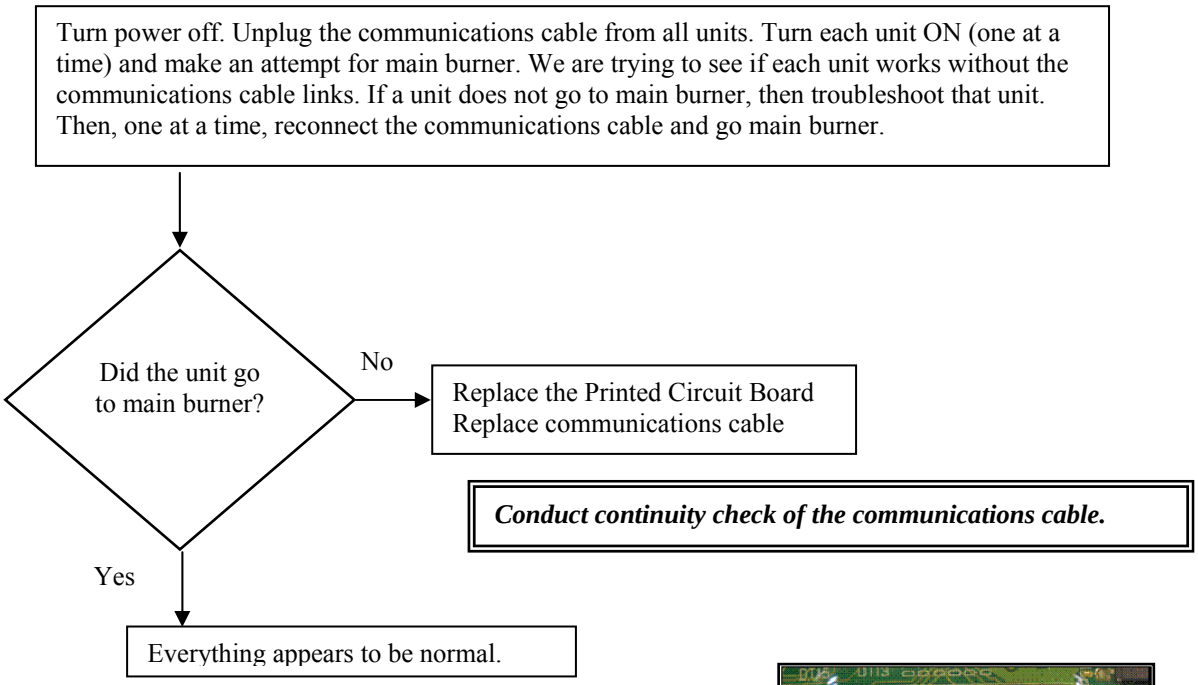
Error Code 03 (MIC-180 & EZLink Only)

Explanation: Manifold Control Failure. The unit has lost the communications link between itself and the MIC-180; or between the two units with EZLink.

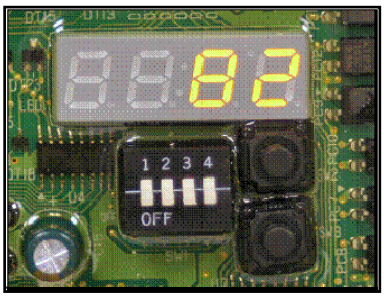


At a minimum check the following:

1. Verify the communications cable is plugged into the printed circuit boards on the water heaters and the MIC-180.
2. Verify #4 Dip Switch is in the ON position for each water heater in the manifold.


Turn power off. Unplug the communications cable from all units. Turn each unit ON (one at a time) and make an attempt for main burner. We are trying to see if each unit works without the communications cable links. If a unit does not go to main burner, then troubleshoot that unit. Then, one at a time, reconnect the communications cable and go main burner.
Did the unit go to main burner?
No
Replace the Printed Circuit Board
Replace communications cable
Conduct continuity check of the communications cable.
Yes
Everything appears to be normal.

Test Run Mode



1. Remove the front cover of the manifold controller.
2. Change the DIP switch #1 setting on the main communication PCB to “ON” position (UP). DO NOT alter any other DIP switch.
3. By pressing the SW2 button located below the LED display on the main communication PCB, the number of the water heater to be tested can be selected. The left two digits flashing on the LED display of the main communication PCB indicates the number of the water that has been selected.

4. Press the SW3 button on the main communication PCB to change to trial operation mode. The left two digits of the LED display will indicate the water heater selected and will illuminate continuously. At the same time, the LED lamp on the main communication PCB or the extended communication PCB corresponding to the water heater selected will illuminate and indicate the water heater is in trial operation mode.
5. Open the hot water outlet. Check and ensure safe operation and performance of the water heater selected.
6. Change the DIP switch #1 setting to the "OFF" position (DOWN) to end the trial operation mode.
7. To choose different water heater for trial operation repeat steps 3 through 6.

MIC 180 Maintenance Mode Table

		SW3 Item Number								
		0	1	2	3	4	5	6	7	8	9
SW2 Group Number	E	PC Version	Error code for n time ago								Not in use
	F	Not in use	Sequence number for n time ago								Not in use
	C	Upper digits of total times of combustion	Upper digits of the number of occurrence of combustion at the time of error n times ago (X10000)								Not in use
	d	Lower digits of total times of combustion	Lower digits of the number of occurrence of combustion at the time of error n times ago (X100)								Not in use
	H	Upper digits of total duration of combustion	Upper digits of the duration of combustion at the time of error n time ago (X1000)								Not in use
	J	Lower digits of total duration of combustion	Lower digits of the duration of combustion at the time of error n time ago (X10)								Not in use
	Y	Not in use	Not in use								Not in use
	A	Not in use	Not in use								Sequence number on the Control Board

Maintenance Information Mode

1. DIP switch #1 on the Unit Number Control Board to the "ON" position
2. DIP switch #3 on the Unit Number Control Board to the "ON" position
3. The hot water heater unit number can be selected by depressing SW2 on the Control Board. The water heater unit number, which is displayed on the left two digits in the Control Board, will be flashing.
4. The Maintenance Mode can be selected by depressing SW3 on the Control Board. The water heater unit number will change from blinking to steady ON.

5. Select the type of maintenance by depressing SW2 (Group Number) and/or SW3 (Item Number)
6. The initial maintenance item is displayed on the two right digits on the display unit flashing between [Maintenance address – E1] and [Maintenance Data – the first error code].
7. If the number of combustion, combustion time is 0, then [- -] will be displayed on the two right digits on the display unit.
8. When the water heater unit number "00" is assigned, the Control Board main body will display the maintenance mode. The upper portion of the maintenance address can be selected with SW2, and the lower with SW3.
9. When the DIPSW 1 and 3 are switched to the "OFF" position, the Maintenance Information Mode will end.

2nd Generation Flame Rod Chart

Flame rod chart is different for second generation 4.2 and 5.3 units. These units have two flame rods; not three. The chart below shows the maintenance information at cell ***0Y.***

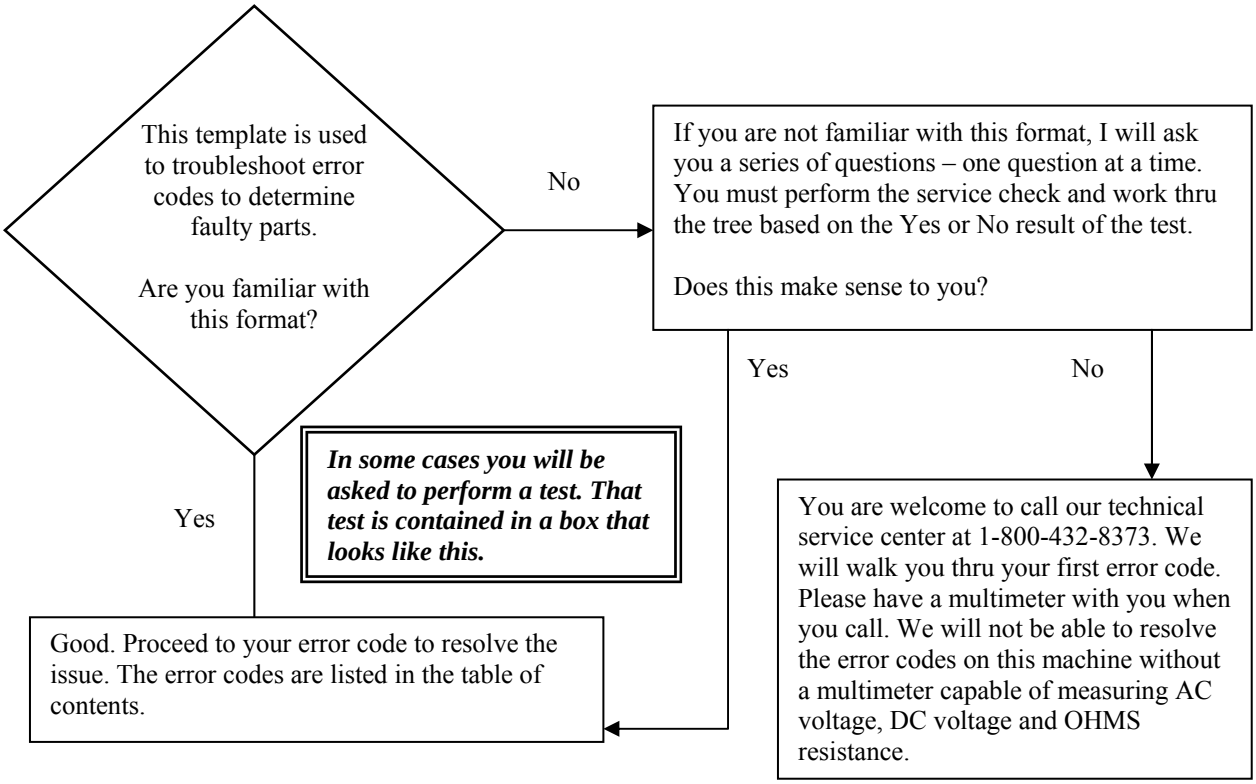
0y display	**00**	**01**	**02**	**03**
Flame Rod 1	X	O	X	O
Flame Rod 2	X	X	O	O

X = Not detecting flame
O = Is detecting flame

Troubleshooting

- When measuring ***resistance*** of a part, turn off the electric power and be sure to disconnect the part completely before measuring (from connector or terminal). Resistance checks are performed on the part while it is disconnected from the control board.
- ***Electrical checks*** are performed with the connectors in place and the unit turned on. (Indoor Model Only) When performing maintenance and/or servicing the water heater without front cover, push the air filter switch down. Without pushing it down, Error Code [21] is displayed.
- All Molex connections only go to one location and fit one way. You do not need to force a connection. Connections are also color coded to aid in reassembly.
- **CAUTION** When performing maintenance and/or servicing the water heater, turn off the electric power, gas shutoff valve and water shutoff valve. Wait for the water heater to become cool. Be careful to avoid injury on the sharp edges.
- **WARNING** Shock hazard - line voltage is present. Before servicing the water heater, turn off the electric power to the water heater at the main disconnect or circuit breaker. Failure to do so could result in severe personal injury or death.

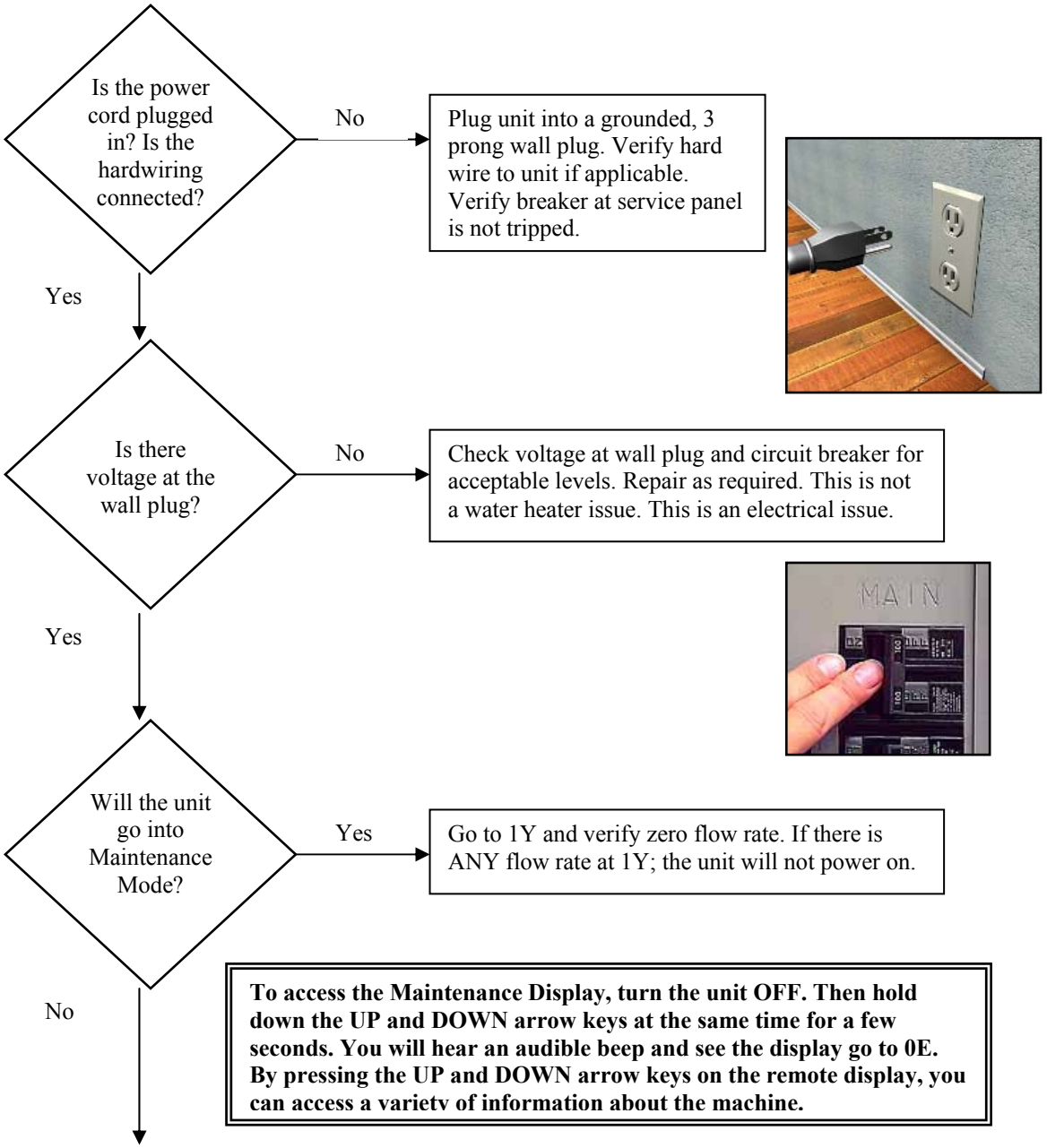
Troubleshooting Format and Example


This template is used to troubleshoot error codes to determine faulty parts.
Are you familiar with this format?
No
If you are not familiar with this format, I will ask you a series of questions – one question at a time. You must perform the service check and work thru the tree based on the Yes or No result of the test.
Does this make sense to you?
Yes
No
Yes
In some cases you will be asked to perform a test. That test is contained in a box that looks like this.
Good. Proceed to your error code to resolve the issue. The error codes are listed in the table of contents.
You are welcome to call our technical service center at 1-800-432-8373. We will walk you thru your first error code. Please have a multimeter with you when you call. We will not be able to resolve the error codes on this machine without a multimeter capable of measuring AC voltage, DC voltage and OHMS resistance.

Unit Will Not Power On

Explanation: Nothing happens when water is flowing through unit. At a minimum check the following in all cases:

1. Make sure unit is connected to proper 3 prong, grounded power supply and circuit breakers are on.
2. Clean cold inlet water supply filter. Ensure you have at least the minimum flow rate required to fire unit. Turn on several fixtures to make sure.
3. On new installations ensure hot and cold water lines are not crossed. Make sure the unit is plumbed cold in to cold inlet. Unit will not fire off if water is running backwards.


Is the power cord plugged in? Is the hardwiring connected?
No
Plug unit into a grounded, 3 prong wall plug. Verify hard wire to unit if applicable. Verify breaker at service panel is not tripped.
Yes
Is there voltage at the wall plug?
No
Check voltage at wall plug and circuit breaker for acceptable levels. Repair as required. This is not a water heater issue. This is an electrical issue.
MAIN
Yes
Will the unit go into Maintenance Mode?
Yes
Go to 1Y and verify zero flow rate. If there is ANY flow rate at 1Y; the unit will not power on.
No
To access the Maintenance Display, turn the unit OFF. Then hold down the UP and DOWN arrow keys at the same time for a few seconds. You will hear an audible beep and see the display go to 0E. By pressing the UP and DOWN arrow keys on the remote display, you can access a variety of information about the machine.

Is there voltage thru the 3 amp fuses?

No → Check fused power leads next to junction box.

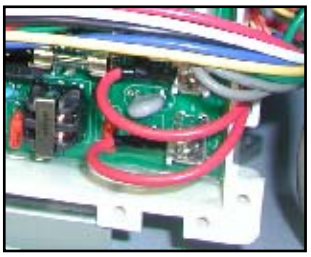
Check and verify the fused leads next to the junction box on the black and white wires are OK. Replace with 3 amp fuses if needed.
Measure the voltage of the wires inside the junction box of the water heater between the black and white wires at 108 – 132 VAC

Yes

Is there power to the Printed Circuit Board from the transformer?

No → Replace transformer

Measure the voltage of the two red wires on the bottom right of the PCB @ 90 - 110 VAC. Second Generation 4.2, 5.3, and 7.4 series have black and white wires for this test. You will also see a true 120 volts. The second generation 4.2, 5.3and 7.4 series units don't have transformer.

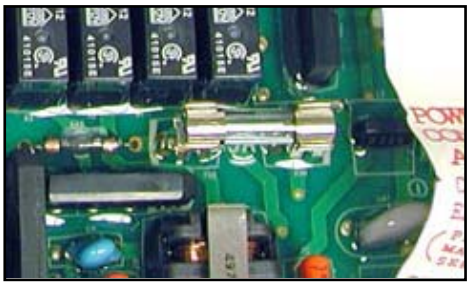


Yes

Is there power to the Printed Circuit Board thru the PCB fuse?

No → Replace 5 amp fuse

Measure the voltage thru the fuse located on the board. Measure both sides of the fuse to ground @ 100 VAC.
The second generation 4.2 and 5.3 units do not have a transformer; you will see 120 volts.



Yes

Unit appears to be OK. Try to restart.

Did the unit go to main burner?

See next page

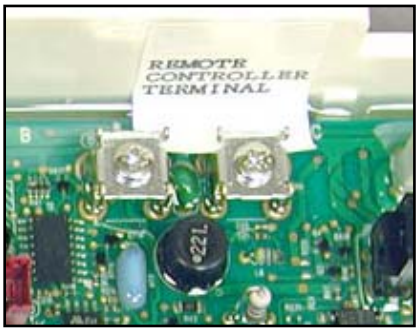
Did the unit go to main burner?

No

Disconnect all remote controls from the PCB and attempt to restart the unit.

Yes

Unit appears to be OK.



Did the unit go to main burner?

No

OK - If you gone this far, there is one more thing to check. The pick-up sensor in the water flow control may be bad; or the board may be bad. Try this test:

Check connector S between the Red and Black. With the unit ON and no water flow, you should be 11-15 DC volts. If not, replace the PCB. IF you have voltage, then.....

With the water flowing, measure 2-5 DC volts between the Brown and Black wire. (This is measuring water flow thru the control). IF you have a reading and no main burner, replace the PCB. If you do not have a reading, replace the water flow sensor.

The problem is with the remote control or the wiring to the remote control. Disconnect all additional wiring to the remote control and connect it directly to the Remote Terminal of the PCB.

Attempt to restart the unit.

Cold water inlet temperature may be to warm to restart the unit. While in maintenance mode, go to 3y and determine the cold water inlet temperature. If the inlet cold water exceeds approximately 75 degrees, you may have a problem with the cold water being too warm for the machine to operate. Run the cold water for at least 3 minutes and recheck temperature.

Call technical service at 1-800-432-8373.

Did the unit go to main burner?

No

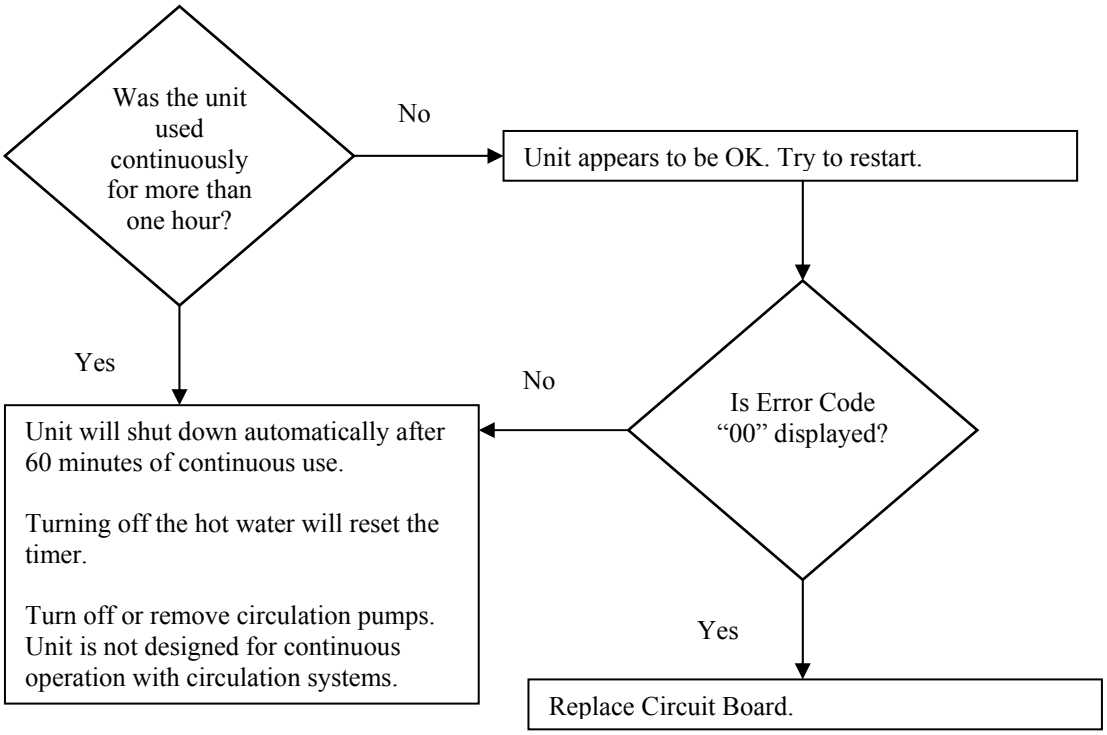
Replace Remote Control

Yes

Replace Remote Control wiring

Error Code 00

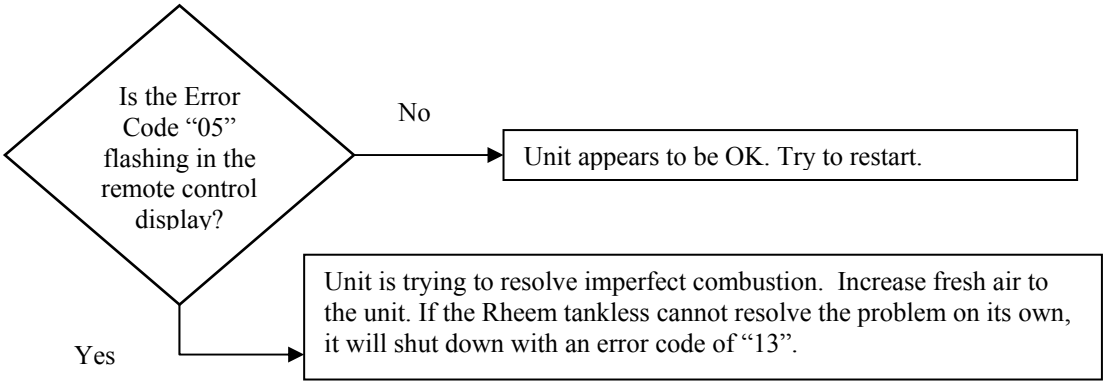
Explanation: One Hour continuous combustion timer is activated. Unit has a 60 minute time that will shut off the main burner if used in excess of one hour. Cold water will continue to flow thru the unit. *(First generation products only – manufacture date thru Jul 06; models manufactured after August 2006 do not have a 60 minute timer.)*


Was the unit used continuously for more than one hour?
No
Unit appears to be OK. Try to restart.
Yes
Is Error Code "00" displayed?
No
Unit will shut down automatically after 60 minutes of continuous use.
Turning off the hot water will reset the timer.
Turn off or remove circulation pumps. Unit is not designed for continuous operation with circulation systems.
Yes
Replace Circuit Board.

Warning Code 05

Explanation: Imperfect Combustion Alarm is flashing. This monitor code explains the unit is having trouble maintaining a good combustion flame. The ODS sensor is activated and trying to resolve the fuel-air mixture issue. At a minimum check the following in all cases:

1. Clean air inlet filter.
2. Check for adequate combustion air ventilation openings.
3. Check and clean combustion air fan.


Is the Error Code "05" flashing in the remote control display?
No
Unit appears to be OK. Try to restart.
Yes
Unit is trying to resolve imperfect combustion. Increase fresh air to the unit. If the Rheem tankless cannot resolve the problem on its own, it will shut down with an error code of "13".

Warning Code 10

Explanation: This is a warning code. Fan Motor is not creating enough ventilation. The venting system passed pre-purge, but has failed during normal operation. At a minimum check the following:

1. Check for blockage of heat exchanger fins.
2. Check heat exchanger flapper valve at vent connection of water heater moves freely.
3. Clean air intake filter.
4. Remove all obstructions. Check the vent termination on the outside of the building and the flapper valve at the top of the heat exchanger.

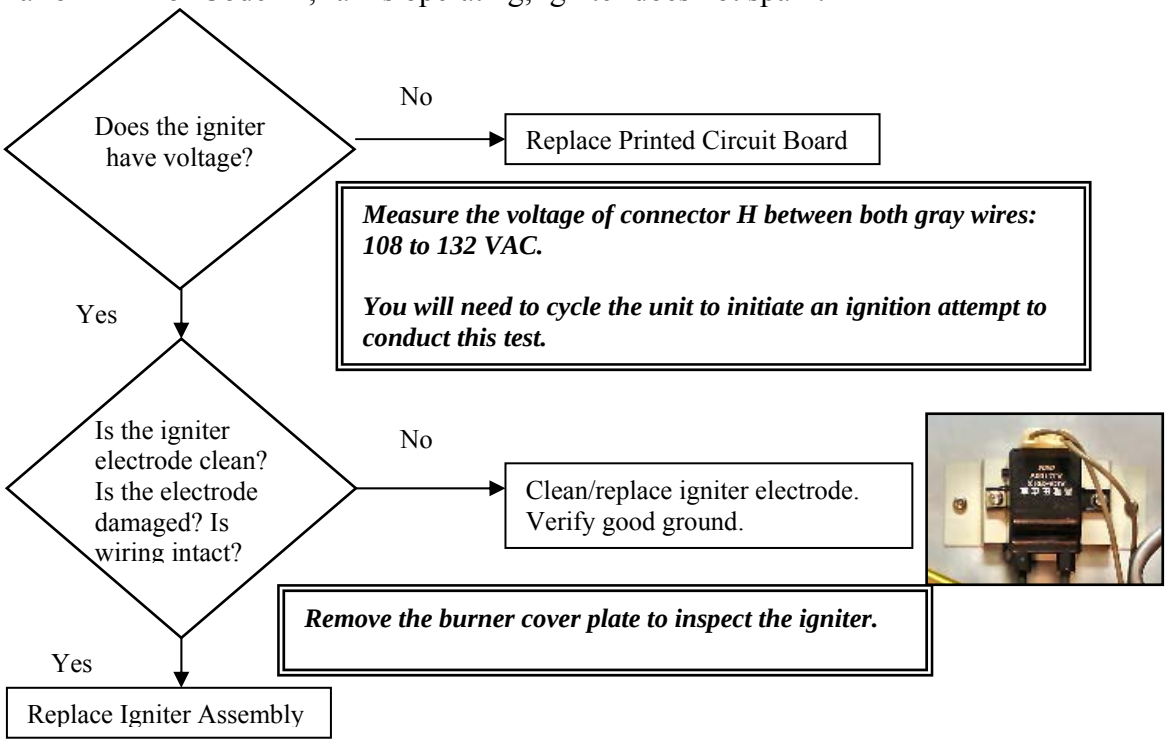
This warning code is followed by failure Error Code 99.

Error Code 11

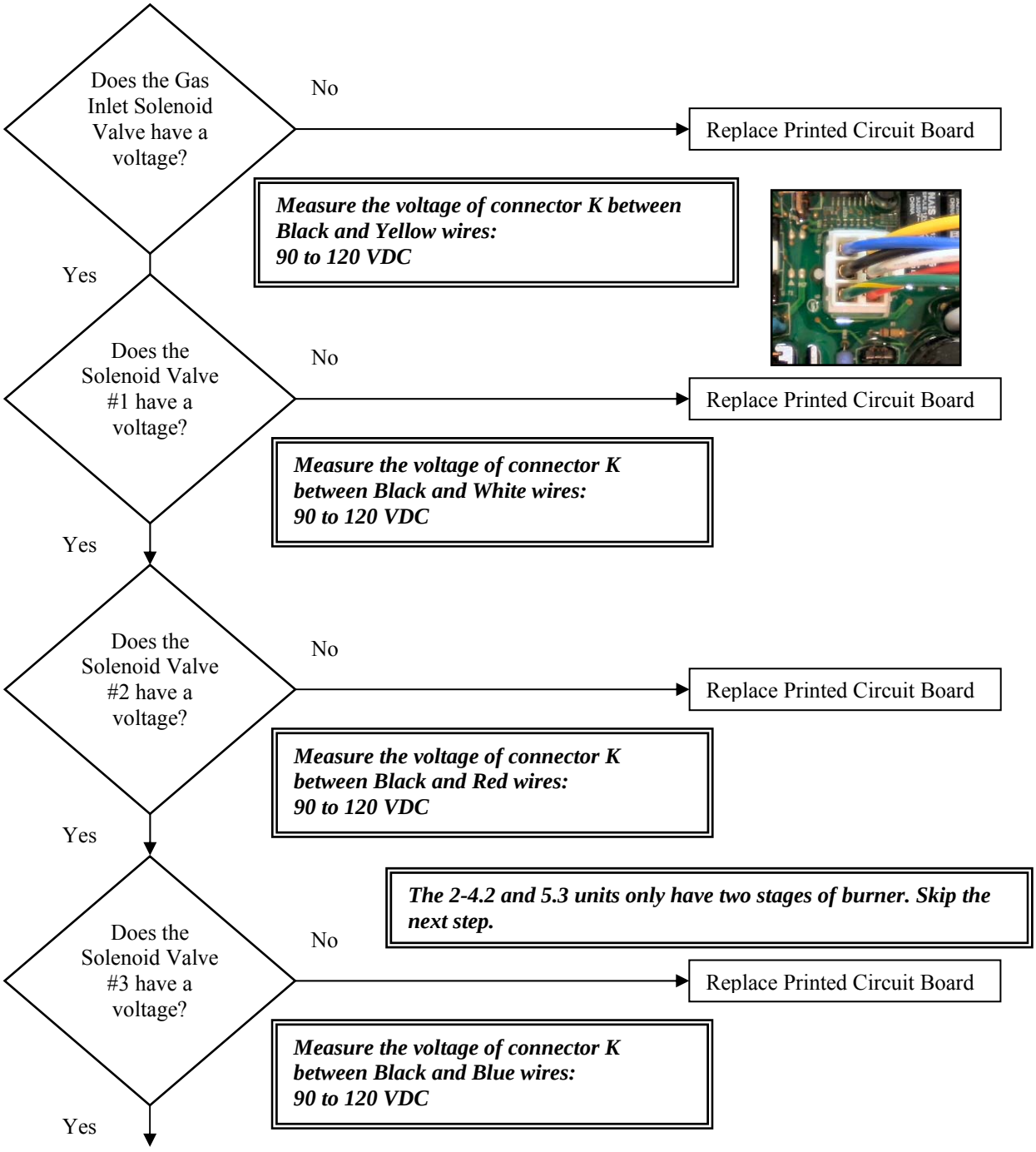
Explanation: No ignition. This error code can be cause one three different scenarios. Please match the scenario to the fault condition before you troubleshoot. At a minimum check the following in all cases:

7. Ensure you have gas to the appliance.
8. Bleed all air from gas lines.
9. Ensure appliance is properly grounded.
10. Ensure gas line, meter, and regulator are sized properly.
11. Ensure gas type and gas pressure to the machine is correct.
12. Flex lines with a full 3/4 inch inside diameter may also restrict fuel flow enough to give you error code 11. We do not condone the use of flex line gas piping with tankless.

Scenario 1 – Error Code 11; fan is operating; igniter does not spark.


Does the igniter have voltage?
No
Replace Printed Circuit Board
Measure the voltage of connector H between both gray wires: 108 to 132 VAC.
You will need to cycle the unit to initiate an ignition attempt to conduct this test.
Yes
Is the igniter electrode clean? Is the electrode damaged? Is wiring intact?
No
Clean/replace igniter electrode. Verify good ground.
Remove the burner cover plate to inspect the igniter.
Yes
Replace Igniter Assembly

Scenario 2 – Error Code 11; fan is operating; igniter does spark; main burner does not ignite.


Does the Gas Inlet Solenoid Valve have a voltage?
No
Replace Printed Circuit Board
Measure the voltage of connector K between Black and Yellow wires: 90 to 120 VDC
Yes
Does the Solenoid Valve #1 have a voltage?
No
Replace Printed Circuit Board
Measure the voltage of connector K between Black and White wires: 90 to 120 VDC
Yes
Does the Solenoid Valve #2 have a voltage?
No
Replace Printed Circuit Board
Measure the voltage of connector K between Black and Red wires: 90 to 120 VDC
Yes
Does the Solenoid Valve #3 have a voltage?
The 2-4.2 and 5.3 units only have two stages of burner. Skip the next step.
No
Replace Printed Circuit Board
Measure the voltage of connector K between Black and Blue wires: 90 to 120 VDC
Yes

Does the P.G.F.R. valve have a voltage?

No → Replace Printed Circuit Board

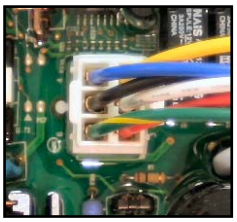
Measure the voltage of connector R between Black#2 and Red#1 wires: 1.5 to 14 VDC

Yes

Is the resistance of the Gas Inlet Solenoid Valve OK?

No → Replace Gas Control Assy

Measure the resistance of connector K between Black and Yellow wires: 0.8 to 2.4k Ohms



Yes

Is the resistance of the Solenoid Valve #1 OK?

No → Replace Gas Control Assy

Measure the resistance of connector K between Black and White wires: 0.8 to 2.4k Ohms

Yes

Is the resistance of the Solenoid Valve #2 OK?

No → Replace Gas Control Assy

Measure the resistance of connector K between Black and Red wires: 0.8 to 2.4k Ohms

Yes

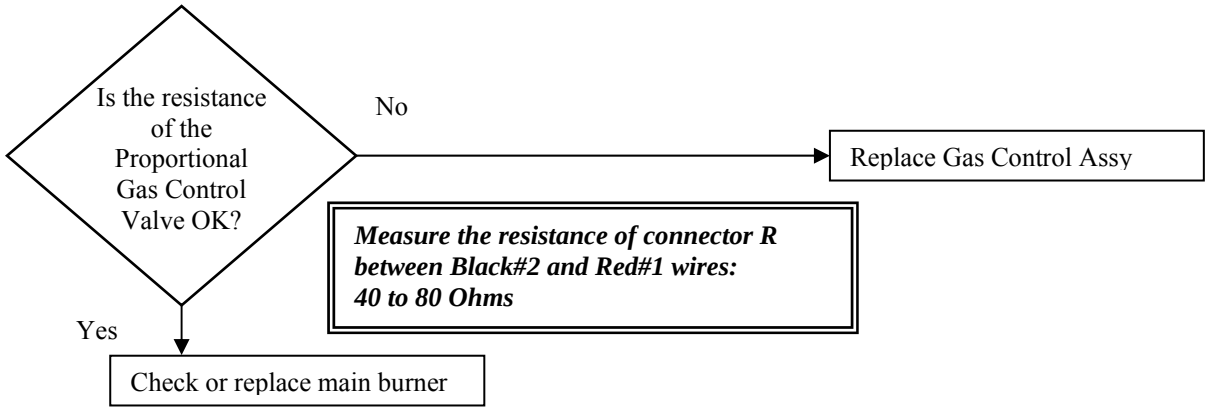
The 2-4.2 and 5.3 units only have two stages of burner. Skip the next step.

Is the resistance of the Solenoid Valve #3 OK?

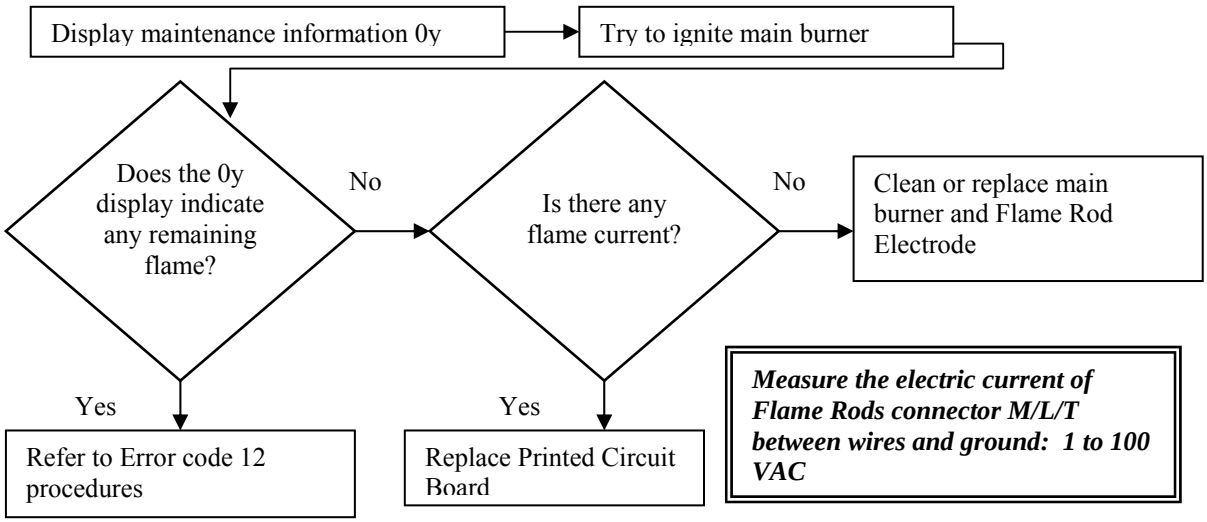
No → Replace Gas Control Assy

Measure the resistance of connector K between Black and Blue wires: 0.8 to 2.4k Ohms

Yes


Is the resistance of the Proportional Gas Control Valve OK?
No
Replace Gas Control Assy
Measure the resistance of connector R between Black#2 and Red#1 wires: 40 to 80 Ohms
Yes
Check or replace main burner

Scenario 3 – Error Code 11; main burner ignites, but shuts off after ignition.


Display maintenance information 0y
Try to ignite main burner
Does the 0y display indicate any remaining flame?
No
Is there any flame current?
No
Clean or replace main burner and Flame Rod Electrode
Yes
Refer to Error code 12 procedures
Yes
Replace Printed Circuit Board
Measure the electric current of Flame Rods connector M/L/T between wires and ground: 1 to 100 VAC

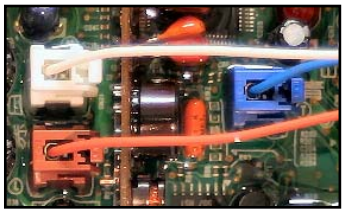
Flame Rod Status: X=not detecting flame; O=is detecting flame

0y display	*00*	*01*	*02*	*03*	*04*	*05*	*06*	*07*
Flame Rod 1(white)	***X***	***O***	***X***	***O***	***X***	***O***	***X***	***O***
Flame Rod 2(red)	***X***	***X***	***O***	***O***	***X***	***X***	***O***	***O***
Flame Rod 3(blue)	***X***	***X***	***X***	***X***	***O***	***O***	***O***	***O***

Note: Notice the colors of the wires to the gas valve solenoids are the same color as the respective flame rods. Flame Rod 1 is the white wire and goes to the right front half burner. Flame Rod 2 is the red wire and goes to the right rear half burner.
Flame Rod 3 is the blue wire and goes to the left burner. (74 Series Only)

Normal flame rod status in the control panel with the burner on should be 01, 03 or 07.

If the burner has been removed for any reason AND any other flame rod status showing detecting flame (zero) probably indicates the flame rod wires are not correctly connected at the flame rod on the burner.

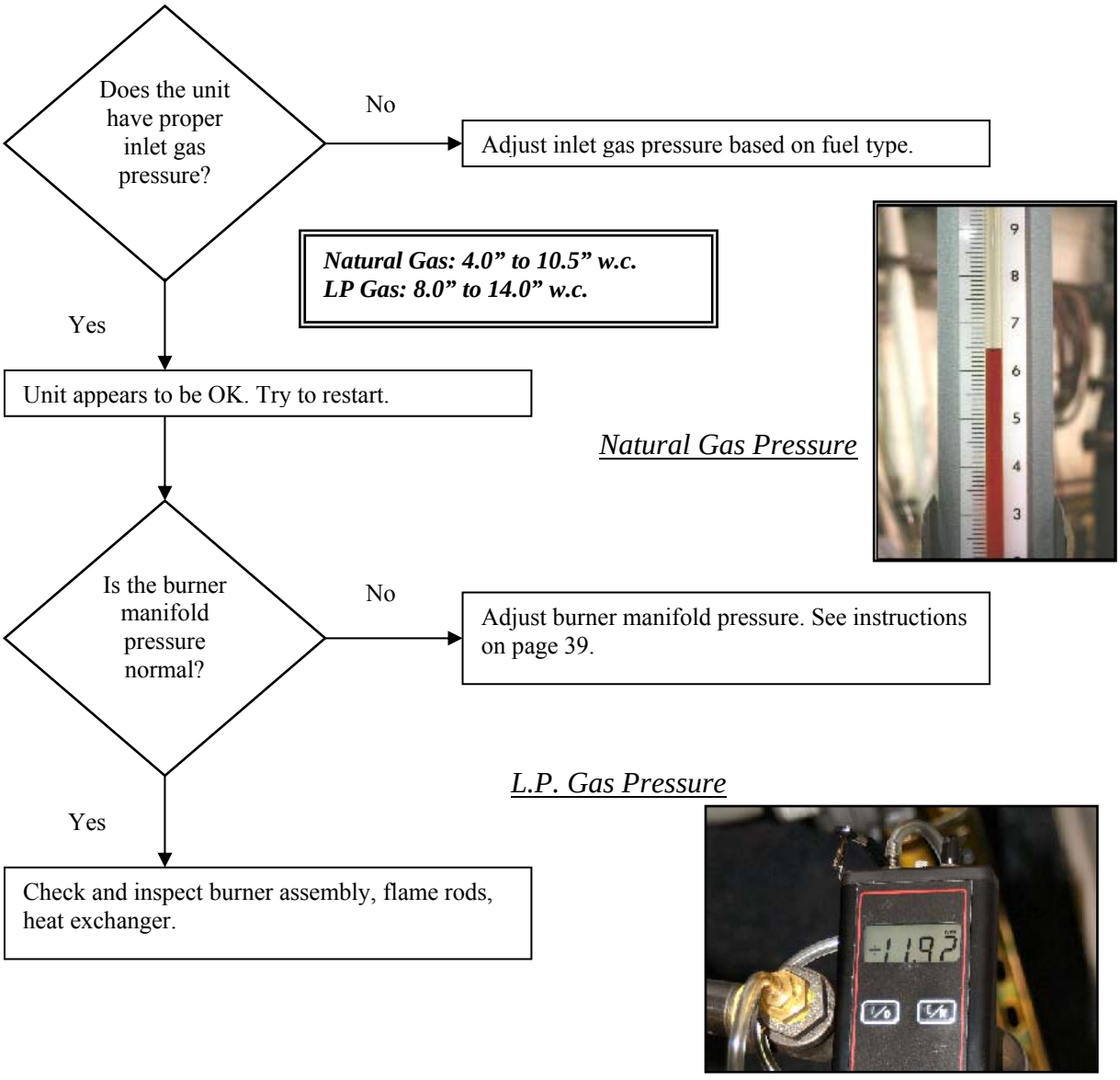


Error Code 12

Explanation: Flame Failure. Unit went to main burner for a period of time; but has since lost flame or the ability to verify the presence of flame. At a minimum check the following in all cases:

1. Bleed all air from gas lines.
2. Ensure appliance is properly grounded.
3. Ensure gas line, meter, and regulator are sized properly.
4. Ensure gas type and gas pressure to the machine is correct.
5. Flex lines with a full 3/4 inch inside diameter may also restrict fuel flow enough to give you error code 11.

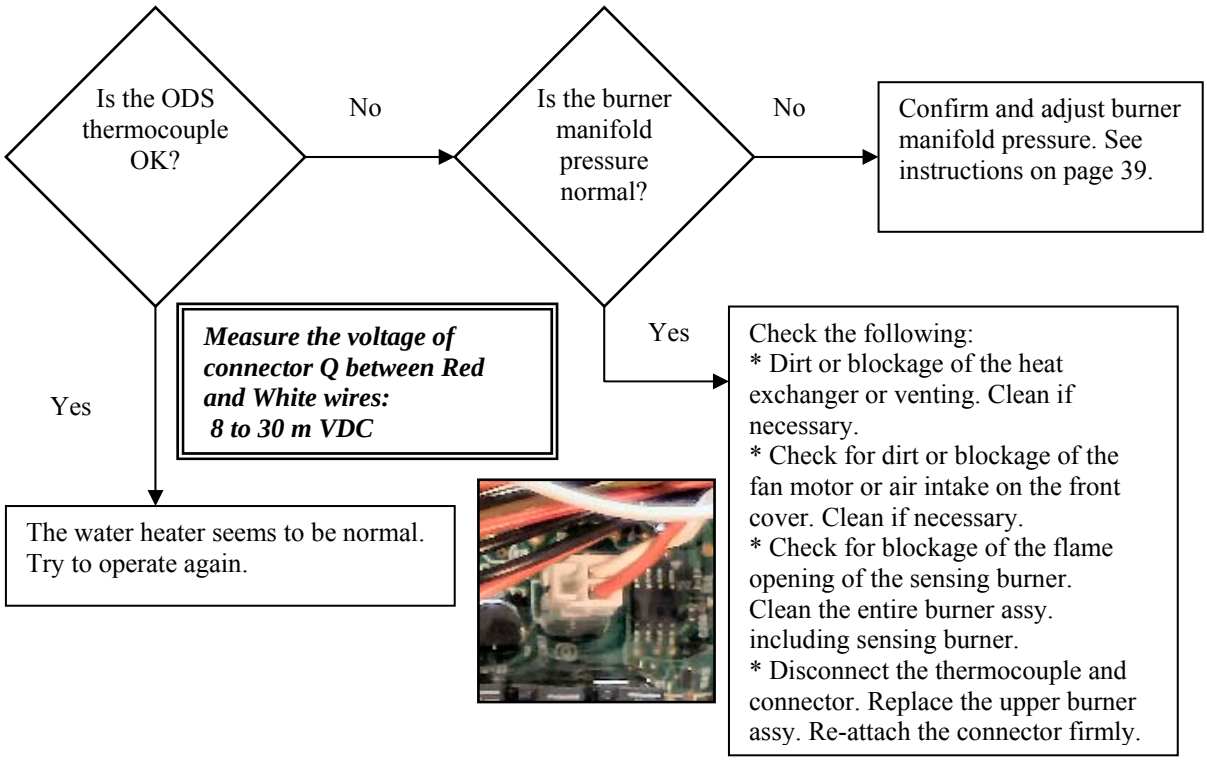
For convenience, the RTG 66 model has a ¼ inch inlet gas pressure check port on the gas connection nipple.


Does the unit have proper inlet gas pressure?
No
Adjust inlet gas pressure based on fuel type.
Natural Gas: 4.0" to 10.5" w.c.
LP Gas: 8.0" to 14.0" w.c.
Yes
Unit appears to be OK. Try to restart.
Natural Gas Pressure
Is the burner manifold pressure normal?
No
Adjust burner manifold pressure. See instructions on page 39.
L.P. Gas Pressure
Yes
Check and inspect burner assembly, flame rods, heat exchanger.

Error Code 13

Explanation: Oxygen Depletion Sensor activated. The unit was not able to resolve an imperfect combustion issue. At a minimum check the following in all cases:

1. Check for lack of fresh combustion air such as in a tight closet.
2. Check maintenance history to see if this is the first incidence of failure with this code.


Is the ODS thermocouple OK?
No
Is the burner manifold pressure normal?
No
Confirm and adjust burner manifold pressure. See instructions on page 39.
Yes
Measure the voltage of connector Q between Red and White wires:
8 to 30 m VDC
Yes
Check the following:
* Dirt or blockage of the heat exchanger or venting. Clean if necessary.
* Check for dirt or blockage of the fan motor or air intake on the front cover. Clean if necessary.
* Check for blockage of the flame opening of the sensing burner. Clean the entire burner assy. including sensing burner.
* Disconnect the thermocouple and connector. Replace the upper burner assy. Re-attach the connector firmly.
The water heater seems to be normal. Try to operate again.

If you get error code 13 and you can not seem to locate the problem, then try this to check for a potential missing sensor damper:

1. Check the wire from the ODS to PCB. A disconnected or loose wire will also show Ø (zero) voltage in maintenance mode.
2. Recycle unit to main burner.
3. Run the unit for at least 3 minutes in main burner mode
4. Did the unit:
    a. Shut down at exactly 2.5 minutes?
    b. Never go to EC '05' to try and fix the problem? (ODS generated too low voltage against minimum required voltage from ODS. The board never "senses" it is in an ODS failure and never tries to correct itself with the '05' code.)
5. If so:
    a. Recycle power and go to maintenance mode.
    b. Go to cell ØA.
    c. Verify Ø voltage present (that is the correct reading) when main burner is off.
    d. Press the ON/OFF button to go to main burner. Turn on a water faucet.
    e. Run the unit for at least 3 minutes and watch the display cell ØA.
    f. If you get between8 mv and 30 mv, then the ODS and burner are probably OK.

g. If within 3 minutes, you get any reading, and then the reading drops below 8 mv, and then goes to Ø, then we have a problem with the ODS, a missing sensor damper or the burner itself. Replace the burner assembly.

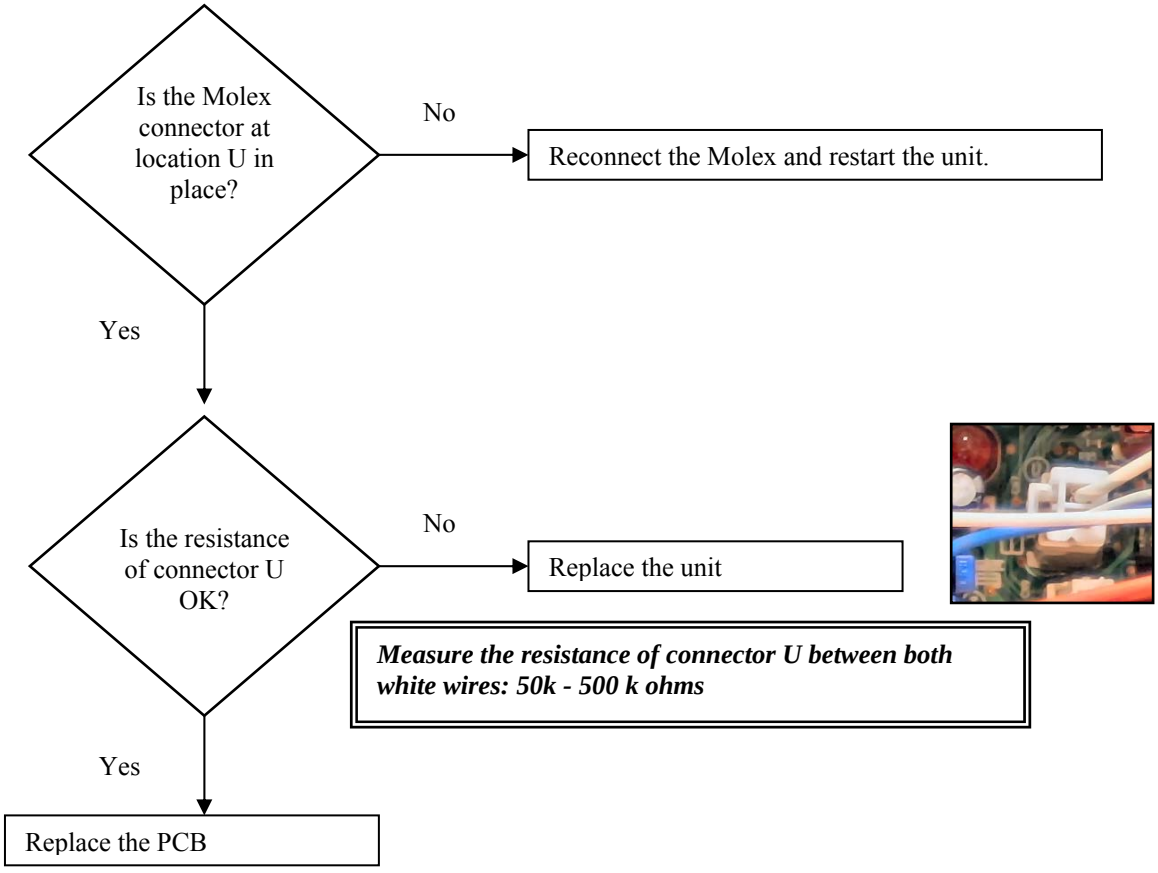
What is the big different between normal error code 13 and no SD (Sensor Damper)? Normally error code 13 is just low voltage or frequency; it means the ODS is still sensing a burner flame. But if the SD is missing, there is no fire on ODS from the beginning of the main burner operation.

Does ODS still generate voltage because main burner ON? Yes, but the voltage is much lower than the PCB requires. You can verify this at cell ØA in maintenance mode.

Error Code 14

Explanation: Overheat Film Wrap has activated. There may be a hot spot on the heat exchanger that has caused the overheat film wrap to fault. At a minimum check the following:

1. Check gas type of unit and ensure it matches gas type being used.
2. Check heat exchanger for cracks and/or separations.
3. Check for restrictions in airflow around unit and vent terminal.
4. Check for a foreign materials in exhaust venting.
5. Before checking resistance of Molex connections, remove the Molex from the circuit board.

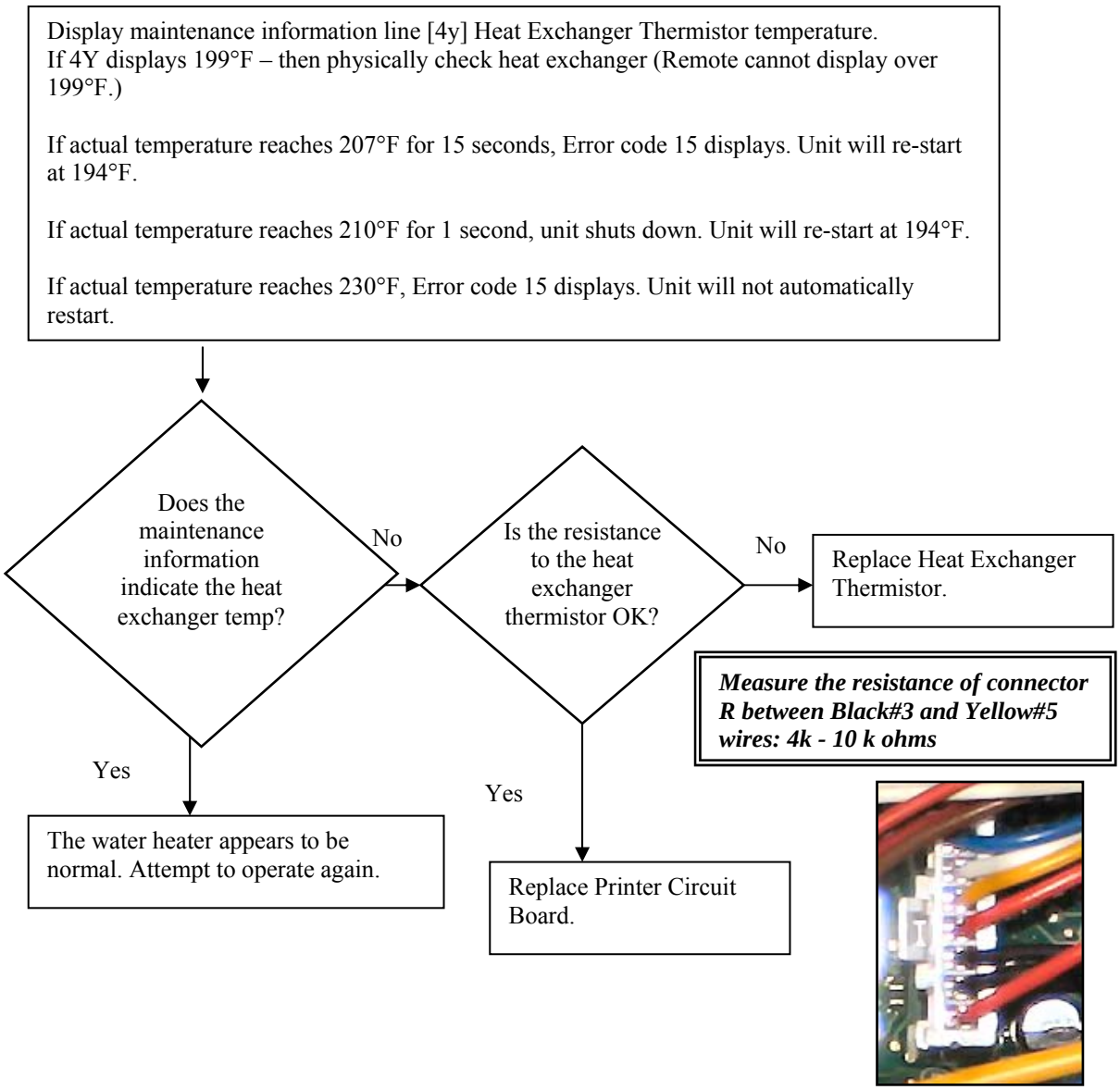

Is the Molex connector at location U in place?
No
Reconnect the Molex and restart the unit.
Yes
Is the resistance of connector U OK?
No
Replace the unit
Measure the resistance of connector U between both white wires: 50k - 500 k ohms
Yes
Replace the PCB

Error Code 15

Explanation: Boiling Safety Device. The heat exchanger is too hot. At a minimum check the following:

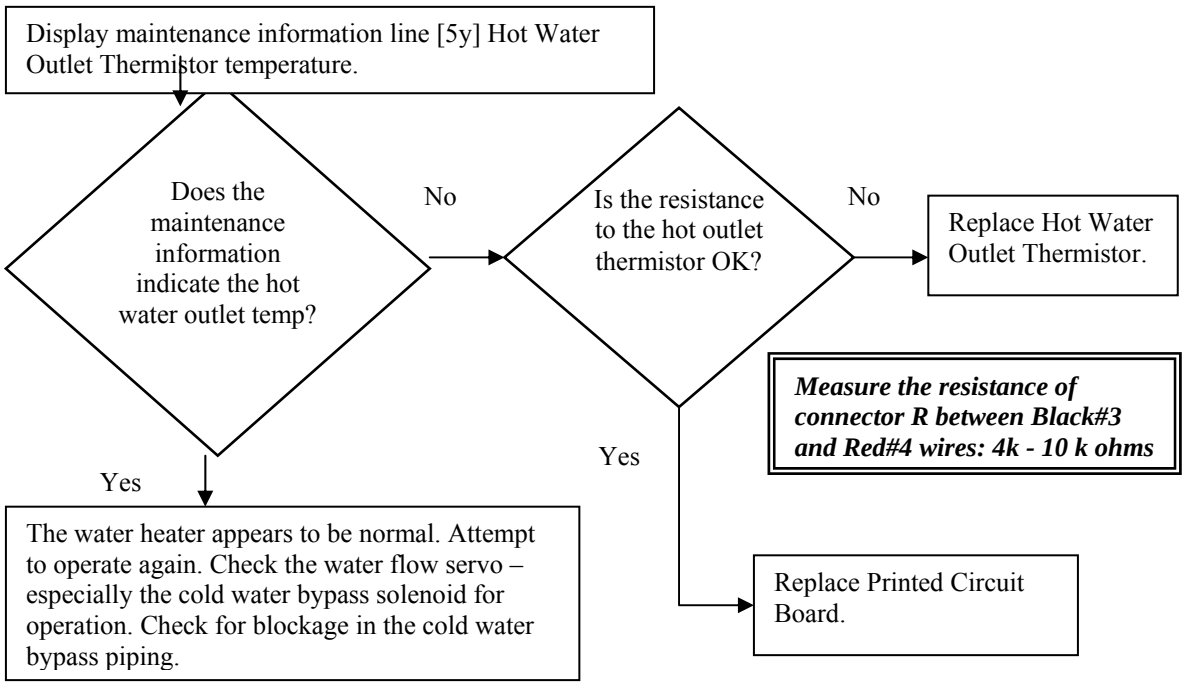
1. Check for restrictions in airflow around unit and vent terminal.
2. Check for a foreign materials in exhaust venting.
3. Back flush the unit to remote any sediment of buildup in the heat exchanger.

See section on how to display maintenance information.


Display maintenance information line [4y] Heat Exchanger Thermistor temperature.
If 4Y displays 199°F – then physically check heat exchanger (Remote cannot display over 199°F.)
If actual temperature reaches 207°F for 15 seconds, Error code 15 displays. Unit will re-start at 194°F.
If actual temperature reaches 210°F for 1 second, unit shuts down. Unit will re-start at 194°F.
If actual temperature reaches 230°F, Error code 15 displays. Unit will not automatically restart.
Does the maintenance information indicate the heat exchanger temp?
No
Is the resistance to the heat exchanger thermistor OK?
No
Replace Heat Exchanger Thermistor.
Measure the resistance of connector R between Black#3 and Yellow#5 wires: 4k - 10 k ohms
Yes
The water heater appears to be normal. Attempt to operate again.
Yes
Replace Printer Circuit Board.

Error Code 16

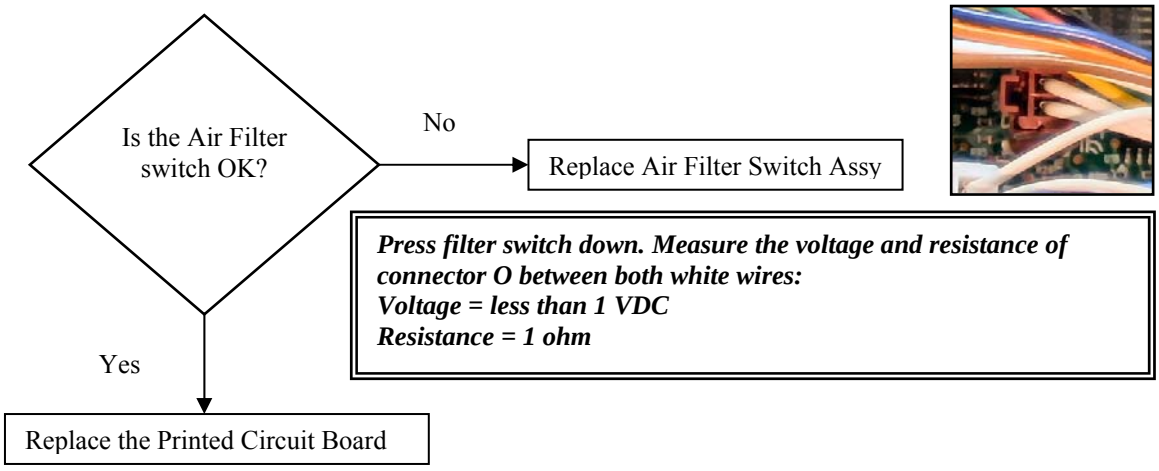
Explanation: Outlet water temperature is to hot. The outlet water temperature is above set point on the remote control. The unit cannot resolve the issue with the cold-water by-pass function.


Display maintenance information line [5y] Hot Water Outlet Thermistor temperature.
Does the maintenance information indicate the hot water outlet temp?
No
Is the resistance to the hot outlet thermistor OK?
No
Replace Hot Water Outlet Thermistor.
Measure the resistance of connector R between Black#3 and Red#4 wires: 4k - 10 k ohms
Yes
Yes
The water heater appears to be normal. Attempt to operate again. Check the water flow servo – especially the cold water bypass solenoid for operation. Check for blockage in the cold water bypass piping.
Replace Printed Circuit Board.

Error Code 21 (Indoor Models Only)

Explanation: Air intake filter switch does not work. The air intake filter switch ensures the front cover is attached and the inlet filter screen is in place and clean. Air intake switch and Error Code 21 has been removed from second generation 4.2, 5.3 and all Direct Vent (DV) models. At a minimum check the following:

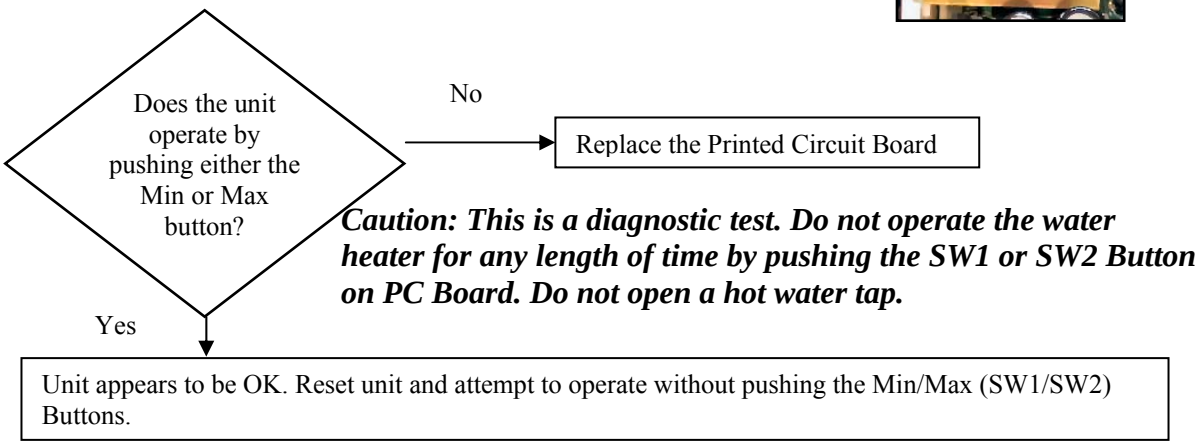
1. Make sure air filter door is properly seated and clean.
2. Make sure front panel is properly installed with all four retaining screws.
3. Press the air intake switch when operating the unit without the front cover installed.


Is the Air Filter switch OK?
No
Replace Air Filter Switch Assy
Press filter switch down. Measure the voltage and resistance of connector O between both white wires:
Voltage = less than 1 VDC
Resistance = 1 ohm
Yes
Replace the Printed Circuit Board

Error Code 24

Explanation: Malfunction of Operational Switch. At a minimum check the following:

1. Disconnect remote control and retry.
2. Verify unit is electrically grounded. Do not use a 2 prong electrical adapter on the power cord.
3. Press MAX (SW2) button on PCB to reset.
4. Press MIN (SW1) button on PCB to reset.
5. Check for presence of return circulation pump in the system. Any water flowing thru the unit prior to turning unit ON may cause error code 24.

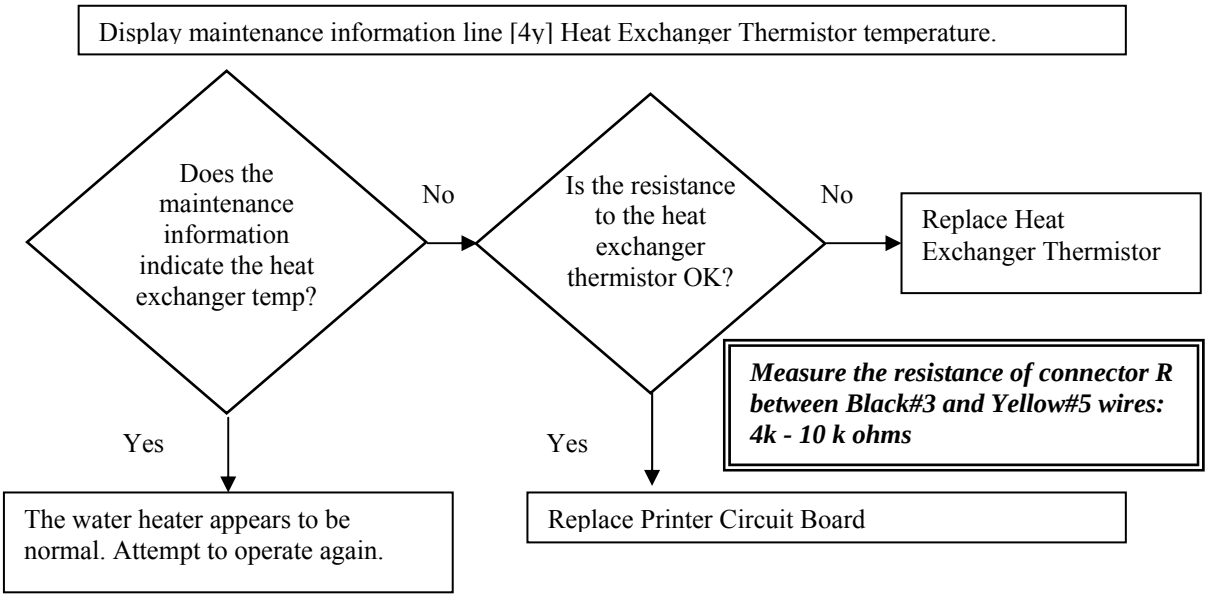

Does the unit operate by pushing either the Min or Max button?
No
Replace the Printed Circuit Board
Yes
Unit appears to be OK. Reset unit and attempt to operate without pushing the Min/Max (SW1/SW2) Buttons.

Caution: This is a diagnostic test. Do not operate the water heater for any length of time by pushing the SW1 or SW2 Button on PC Board. Do not open a hot water tap.

Error Code 29

Explanation: Heat Exchanger outlet temperature is too low. At a minimum check the following:

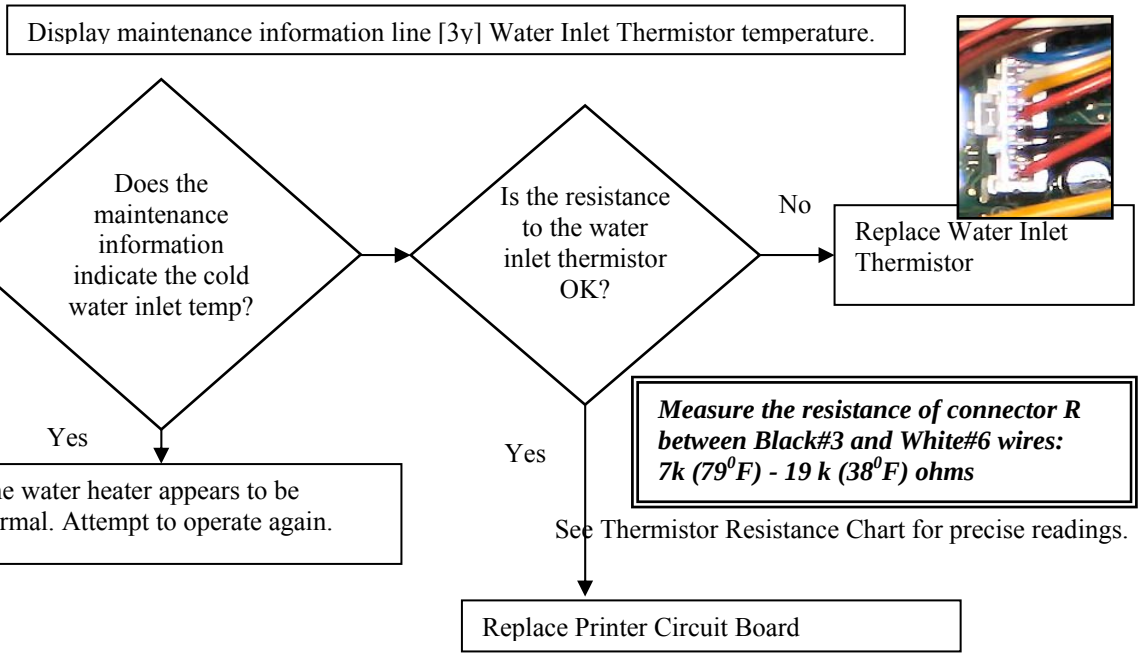
1. Clean air inlet filter.
2. Check for buildup on the heat exchanger fins.
3. Set thermostat to 120 degrees. Verify heat exchanger temperature with water at hot outlet.


Display maintenance information line [4y] Heat Exchanger Thermistor temperature.
Does the maintenance information indicate the heat exchanger temp?
No
Is the resistance to the heat exchanger thermistor OK?
No
Replace Heat Exchanger Thermistor
Yes
Yes
Measure the resistance of connector R between Black#3 and Yellow#5 wires: 4k - 10 k ohms
The water heater appears to be normal. Attempt to operate again.
Replace Printer Circuit Board

Error Code 31

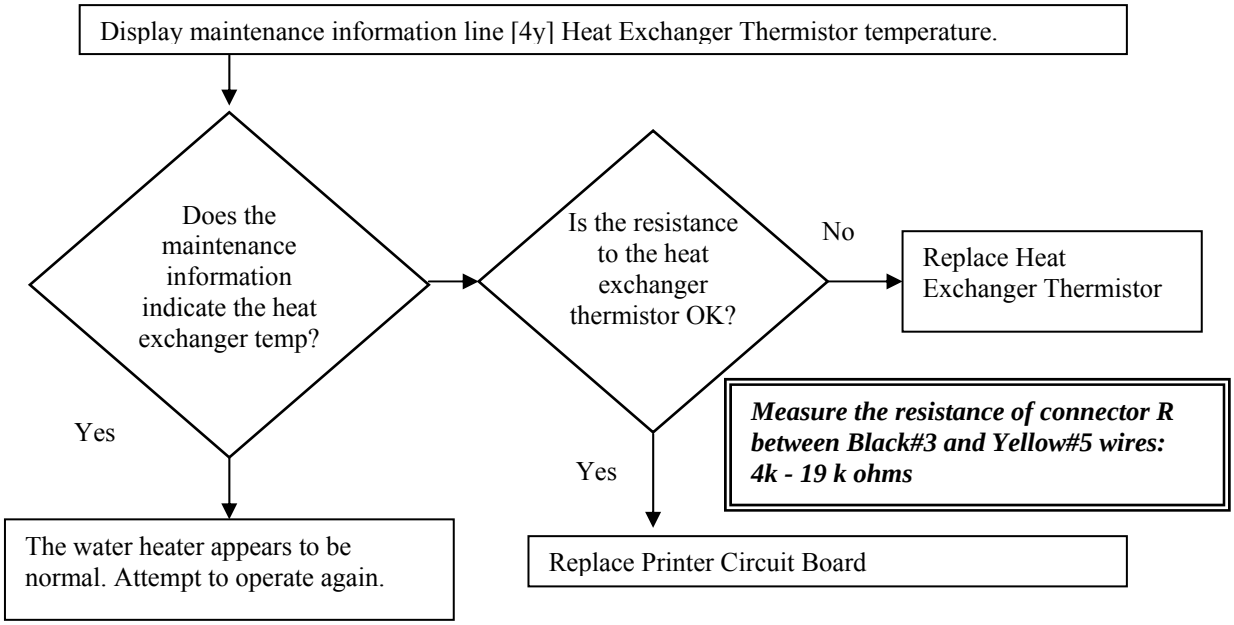
Explanation: Water Inlet Thermistor has malfunctioned. At a minimum check the following if you get Error Codes 31, 32, 33, & 34:

1. Check for scale build up on the inlet filter screen. This scale build up could also happen inside the machine. Scale build up on all thermistors will cause them to be inaccurate.
2. IF maintenance mode shows 32 degrees as the temperature, then the thermistor is not making connection. (Possibly unplugged, possibly broken wire).
3. IF maintenance mode shows 199 degrees the thermistor has a direct short.


Display maintenance information line [3y] Water Inlet Thermistor temperature.
Does the maintenance information indicate the cold water inlet temp?
Is the resistance to the water inlet thermistor OK?
No
Replace Water Inlet Thermistor
Yes
The water heater appears to be normal. Attempt to operate again.
Yes
Measure the resistance of connector R between Black#3 and White#6 wires: 7k (79°F) - 19 k (38°F) ohms
See Thermistor Resistance Chart for precise readings.
Replace Printer Circuit Board

Error Code 32

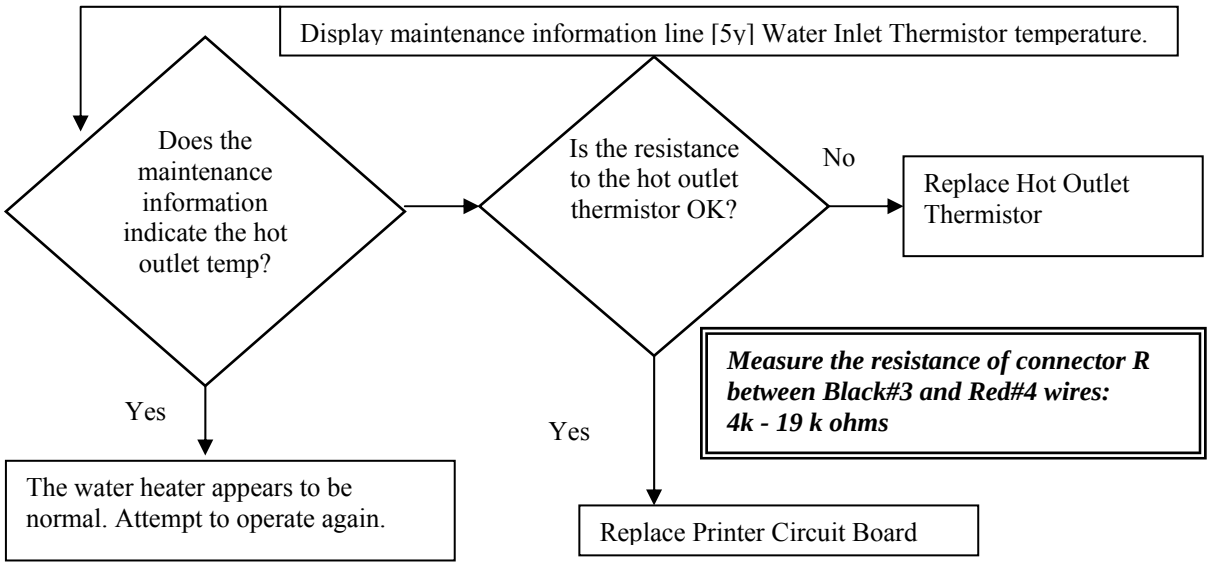
Explanation: Heat Exchanger Thermistor has malfunctioned. At a minimum check the following:


Display maintenance information line [4y] Heat Exchanger Thermistor temperature.
Does the maintenance information indicate the heat exchanger temp?
Is the resistance to the heat exchanger thermistor OK?
No
Replace Heat Exchanger Thermistor
Yes
The water heater appears to be normal. Attempt to operate again.
Yes
Measure the resistance of connector R between Black#3 and Yellow#5 wires: 4k - 19 k ohms
Replace Printer Circuit Board

Error Code 33

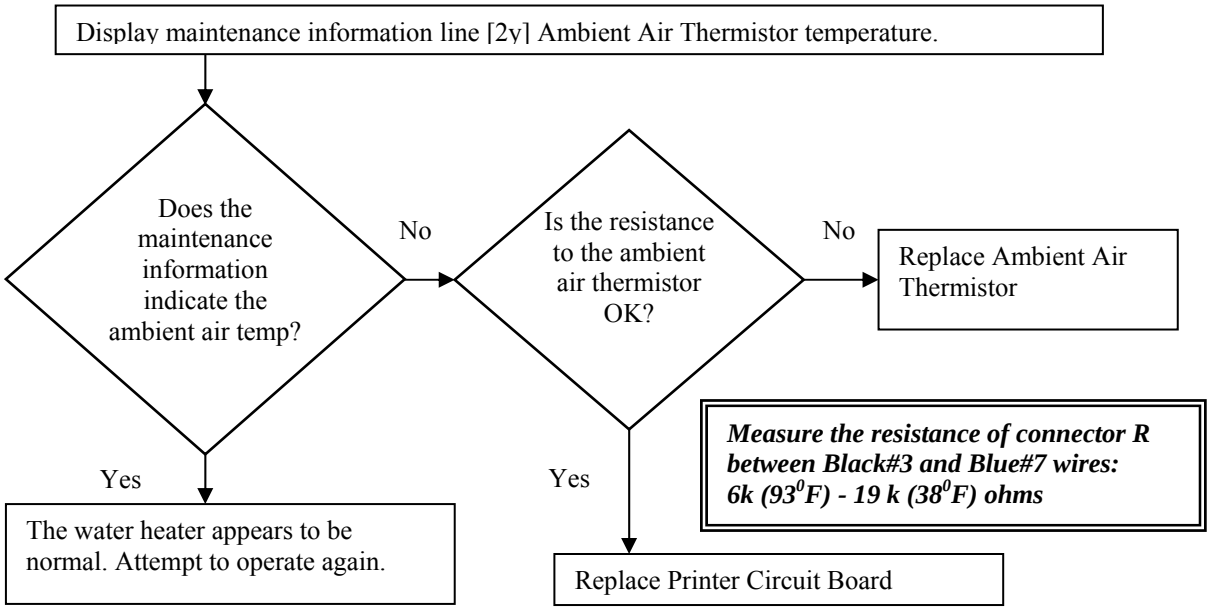
Explanation: Hot Water Outlet Thermistor has malfunctioned. At a minimum check the following if you get Error Codes 31, 32, 33, & 34:

1. Check for scale build up on the inlet filter screen. This scale build up could also happen inside the machine. Scale build up on all thermistors will cause them to be inaccurate.
2. IF maintenance mode shows 32 degrees as the temperature, then the thermistor is not making connection. (Possibly unplugged, possibly broken wire).
3. IF maintenance mode shows 199 degrees the thermistor has a direct short.


Display maintenance information line [5y] Water Inlet Thermistor temperature.
Does the maintenance information indicate the hot outlet temp?
Is the resistance to the hot outlet thermistor OK?
No
Replace Hot Outlet Thermistor
Measure the resistance of connector R between Black#3 and Red#4 wires: 4k - 19 k ohms
Yes
Yes
The water heater appears to be normal. Attempt to operate again.
Replace Printer Circuit Board

Error Code 34

Explanation: Explanation: Ambient Combustion Air Thermistor has malfunctioned. At a minimum check the following:


Display maintenance information line [2y] Ambient Air Thermistor temperature.
Does the maintenance information indicate the ambient air temp?
No
Is the resistance to the ambient air thermistor OK?
No
Replace Ambient Air Thermistor
Measure the resistance of connector R between Black#3 and Blue#7 wires: 6k (93^{0}F) - 19 k (38^{0}F) ohms
Yes
Yes
The water heater appears to be normal. Attempt to operate again.
Replace Printer Circuit Board

Error Code 35

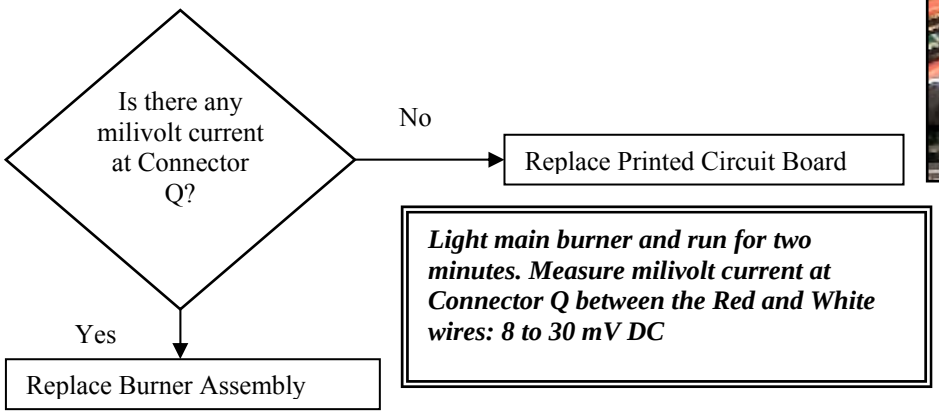
Explanation: Improper Thermistor Connections. Check to make sure that all thermistor connections are good and in the proper locations. There are four thermistors on the tankless unit. They are the ambient air thermistor, cold water inlet, hot water outlet and heat exchanger thermistor. At a minimum check the following:

1. Check thermistor wiring and Molex connections.
2. Check and clean ambient air temperature thermistor.
3. There is no troubleshooting for this error code other than a visual inspection.
4. If a thermistor fails resistance check, then use that error code to process.
5. If all thermistors check good, then replace the board as first resolution.

Error Code 38

Explanation: Oxygen Depletion Sensor has malfunctioned. The sensor itself is not responding to the printed circuit board. At a minimum check the following:

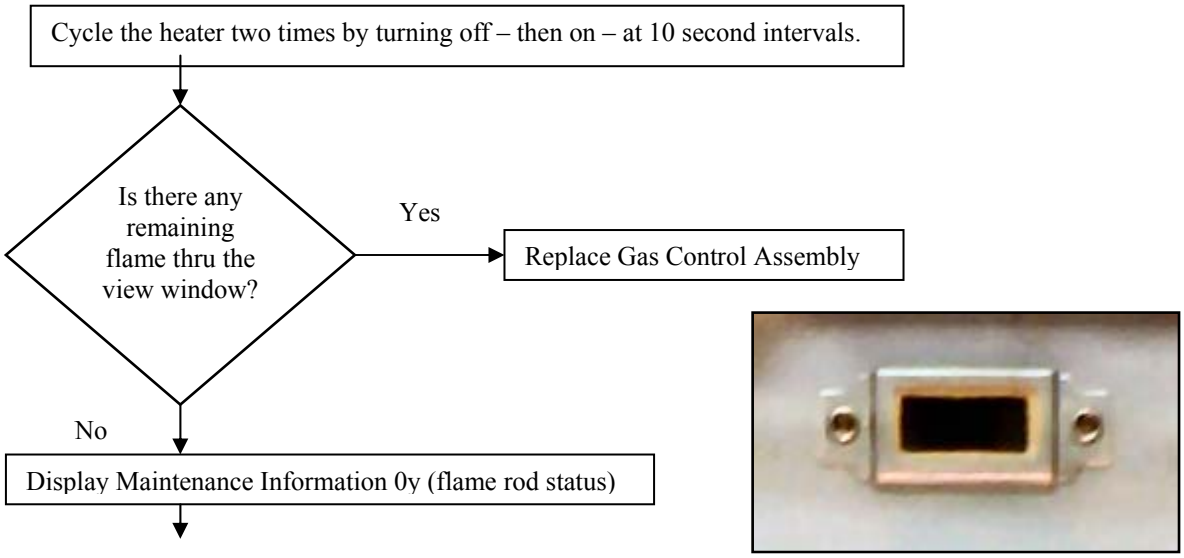
1. Check sensor wiring and Molex connections at connector Q.


Is there any milivolt current at Connector Q?
No
Replace Printed Circuit Board
Yes
Replace Burner Assembly
Light main burner and run for two minutes. Measure milivolt current at Connector Q between the Red and White wires: 8 to 30 mV DC

Error Code 51

Explanation: Gas Inlet Solenoid Valve fault. At a minimum check the following:

3. Check gas valve wiring harnesses for loose or damage terminals
4. Check connections to the circuit board are tight.


Cycle the heater two times by turning off – then on – at 10 second intervals.
Is there any remaining flame thru the view window?
Yes
Replace Gas Control Assembly
No
Display Maintenance Information 0y (flame rod status)

Does the 0y display indicate any remaining flame?

Flame Rod Status (Flame Rod #3 for 74 Series Only)

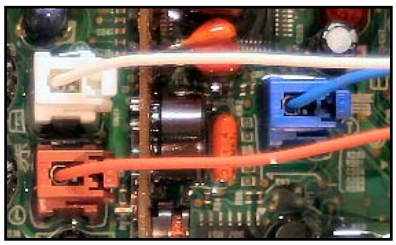
0y display	*00*	*01*	*02*	*03*	*04*	*05*	*06*	*07*
Flame Rod 1	*X*	*O*	*X*	*O*	*X*	*O*	*X*	*O*
Flame Rod 2	*X*	*X*	*O*	*O*	*X*	*X*	*O*	*O*
Flame Rod 3	*X*	*X*	*X*	*X*	*O*	*O*	*O*	*O*

X=Not detecting flame
O=is detecting flame

Yes

No → The water heater seems to be normal. Try to operate again

Pull out the relay connection of flame rod connectors (M), (L), (T) and then display maintenance information [0y].



Does the 0y display indicate any remaining flame?

No → Clean or replace Main Burner and Flame Rod Electrodes

Yes → Replace Printed Circuit Board

Error Code 52

Explanation: Proportional Gas Flow Regulator (P.G.F.R.) Valve fault. Check gas inlet solenoid valve wiring harnesses for loose or damage terminals; and connections to the circuit board are tight.

Is there power to the P.G.R.F. valve?

No → Replace the Printed Circuit Board

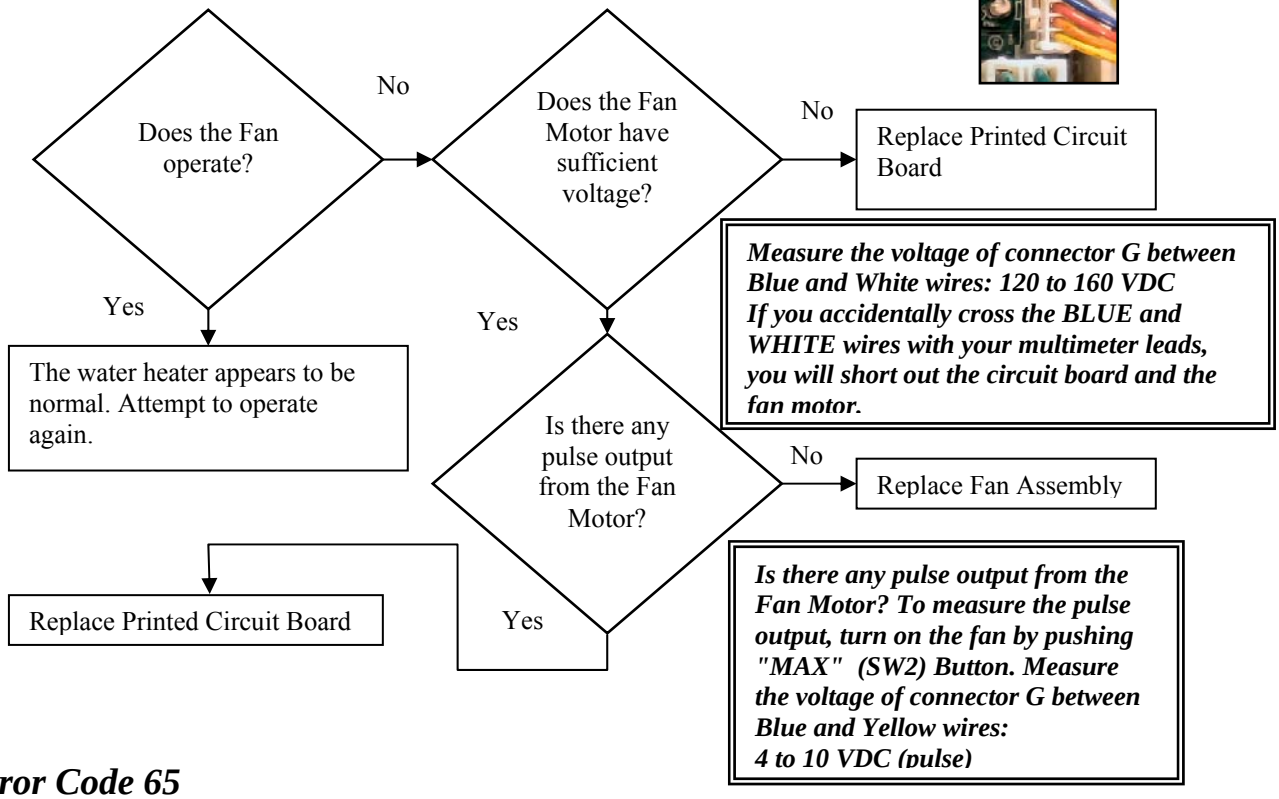
With the unit attempting to go to main burner, measure the voltage at connector R between the Red#1 and Black #2 wires for: 1.5 to 14 VDC

Yes → Replace P.G.R.F Valve

Error Code 61

Explanation: Combustion Fan failure. Fan motor does not work properly. At a minimum check the following:

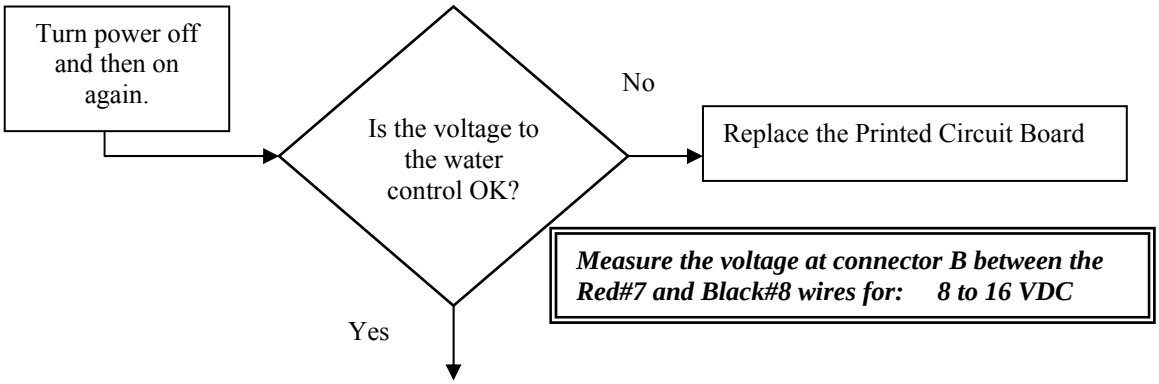
5. Ensure fan motor will turn freely. Motor will operate with a small amount of restriction.
6. Check there is some volume of air from the flue outlet at the top of the heater.
7. Check wiring harness to motor for damaged and/or loose connections.
8. Check Molex connections of the PCB.

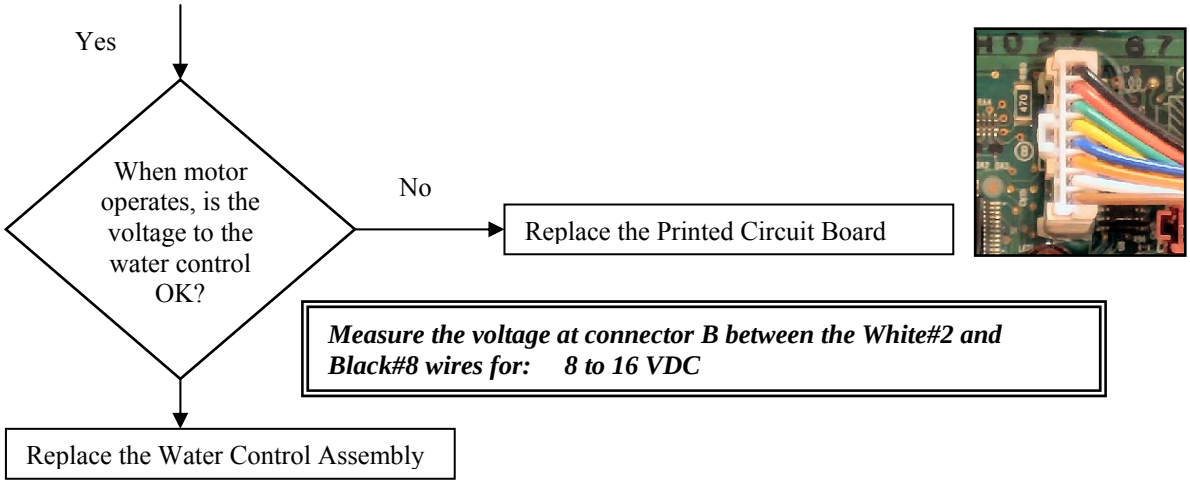

Does the Fan operate?
No
Does the Fan Motor have sufficient voltage?
No
Replace Printed Circuit Board
Measure the voltage of connector G between Blue and White wires: 120 to 160 VDC
If you accidentally cross the BLUE and WHITE wires with your multimeter leads, you will short out the circuit board and the fan motor.
Yes
The water heater appears to be normal. Attempt to operate again.
Yes
Is there any pulse output from the Fan Motor?
No
Replace Fan Assembly
Replace Printed Circuit Board
Yes
Is there any pulse output from the Fan Motor? To measure the pulse output, turn on the fan by pushing "MAX" (SW2) Button. Measure the voltage of connector G between Blue and Yellow wires:
4 to 10 VDC (pulse)

Error Code 65

Explanation: Water Volume Control fault. At a minimum check the following:

4. Verify there is water flow thru the unit even if the unit does not fire.
5. Access maintenance information to determine flow rate.
6. Check all wiring connections to the water control and connector B on the Printed Circuit Board.

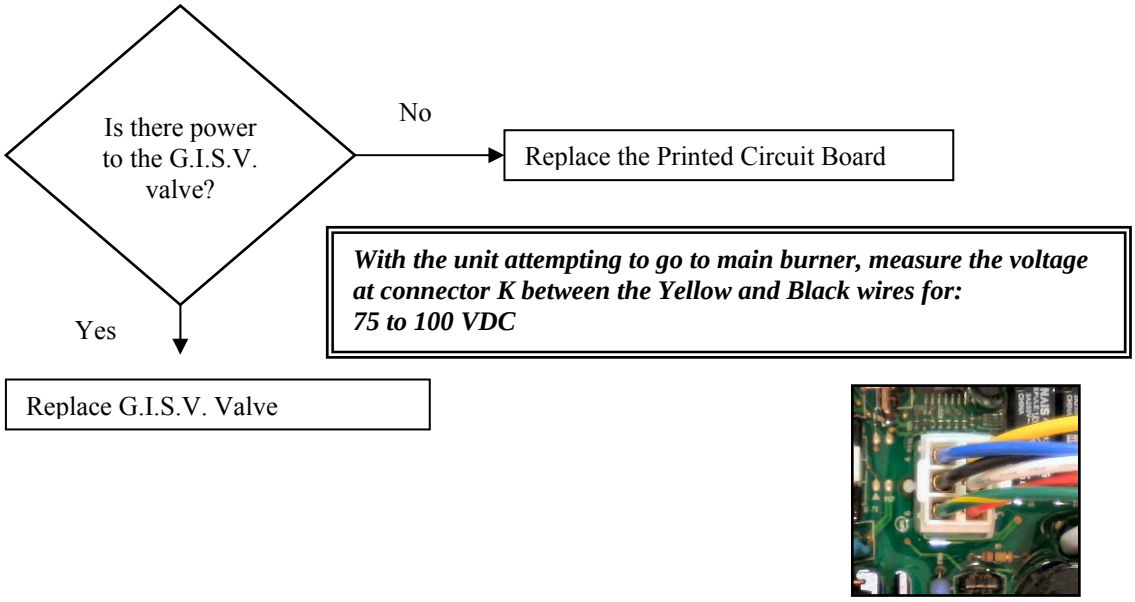

Turn power off and then on again.
Is the voltage to the water control OK?
No
Replace the Printed Circuit Board
Measure the voltage at connector B between the Red#7 and Black#8 wires for: 8 to 16 VDC
Yes


Yes
When motor operates, is the voltage to the water control OK?
No
Replace the Printed Circuit Board
Measure the voltage at connector B between the White#2 and Black#8 wires for: 8 to 16 VDC
Replace the Water Control Assembly

Error Code 66 (RTG66 Only)

Error Code 71

Explanation: Gas Inlet Solenoid Valve (G.I.S.V) fault. Check gas inlet solenoid valve wiring harnesses for loose or damage terminals; and connection K to the circuit board is tight.


Is there power to the G.I.S.V. valve?
No
Replace the Printed Circuit Board
With the unit attempting to go to main burner, measure the voltage at connector K between the Yellow and Black wires for: 75 to 100 VDC
Yes
Replace G.I.S.V. Valve

Error Code 72

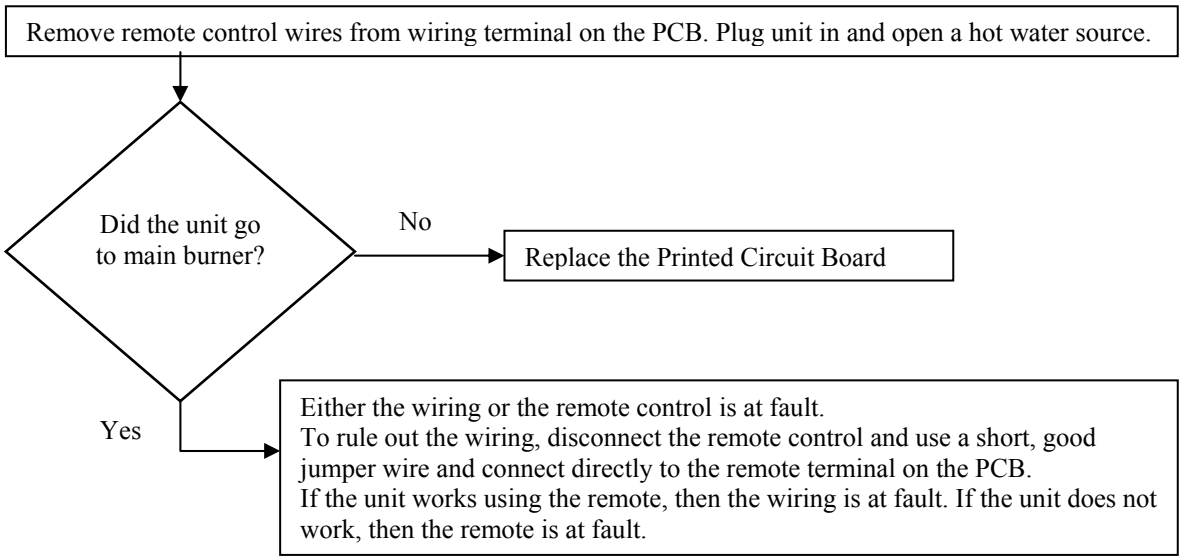
Explanation: Flame Sensing Device fault. The Flame Probes are sensing the presence of flame when there is not suppose to be any flame.

See and follow the same procedure as used in Error Code 51.

Error Code 76

Explanation: Communication Fault with Remote Control. At a minimum check the following:

1. Check remote control wiring for loose or damaged connections.
2. Bypass remote control cable by connecting remote control directly to remote control terminals on PCB. Replace cable if found to be faulty.


Remove remote control wires from wiring terminal on the PCB. Plug unit in and open a hot water source.
Did the unit go to main burner?
No
Replace the Printed Circuit Board
Yes
Either the wiring or the remote control is at fault.
To rule out the wiring, disconnect the remote control and use a short, good jumper wire and connect directly to the remote terminal on the PCB.
If the unit works using the remote, then the wiring is at fault. If the unit does not work, then the remote is at fault.

Error Code 79

Explanation: Fan Motor Current fault. Fan motor does not work properly. At a minimum check the following:

1. Ensure fan motor will turn freely. Motor will operate with a small amount of restriction.
2. Check fan motor for presence of moisture of condensation.
3. Check wiring harness to motor for damaged and/or loose connections.

See and follow the same procedure as used in Error Code 61.

Error Code 80/81

Explanation: Gas Cut-off Failure / Extinction Failure

See and follow the same procedure as used in Error Code 51.

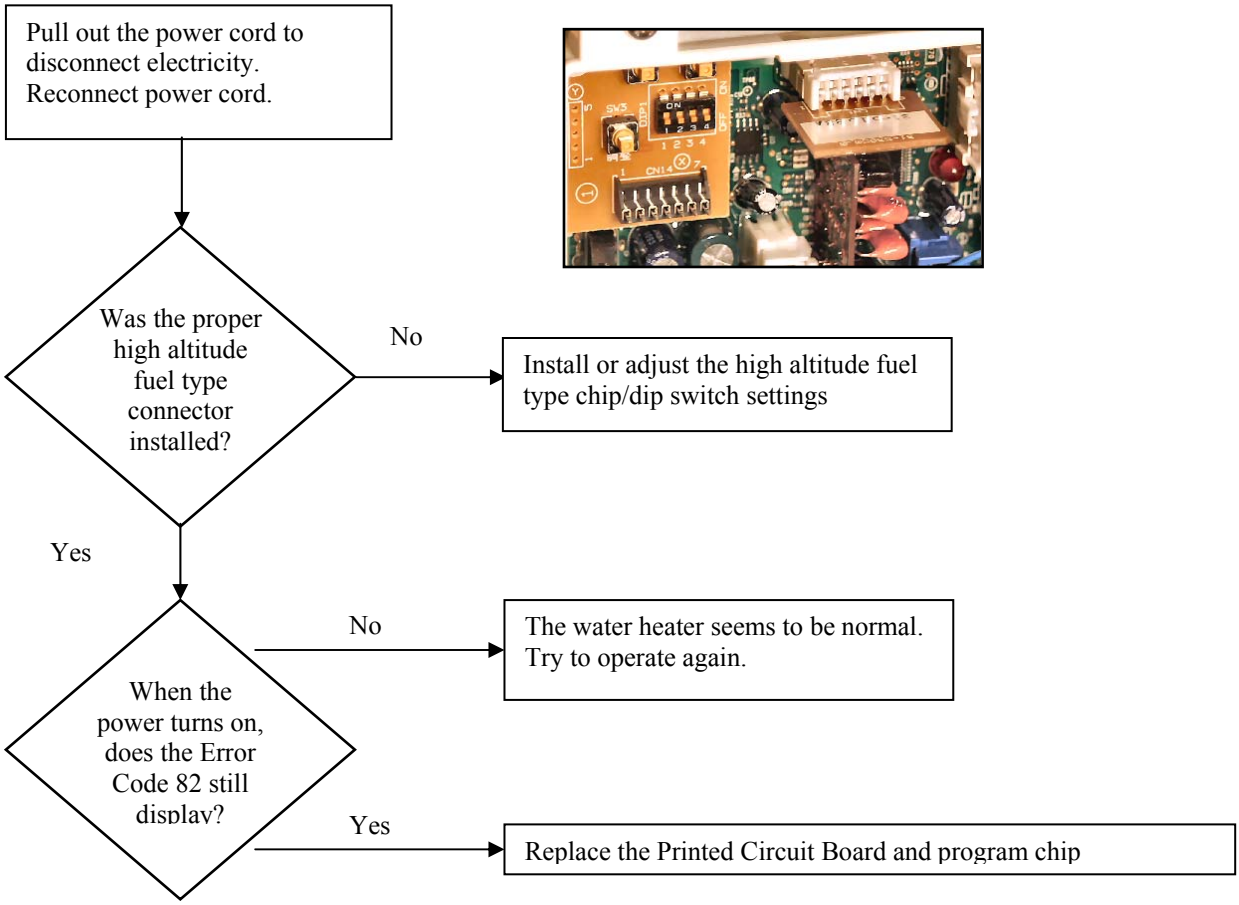
Error Code 82

Explanation: Gas Type Control Data Failure; Printed Circuit Board data failure. The PCB has not been programmed, lost its programming or has failed.
At a minimum check the following:

3. Check for the presence of the program chip installed on the PCB.
4. If the unit has operated for a period of time after installation, then the PCB was programmed.

5. If the unit does not operate on initial installation or after replacement of the PCB, then the circuit board requires programming with the fuel type and altitude chip.

WARNING: When replacing High Altitude Connector, turn off the electric power to water heater.


Pull out the power cord to disconnect electricity. Reconnect power cord.
Was the proper high altitude fuel type connector installed?
No
Install or adjust the high altitude fuel type chip/dip switch settings
Yes
When the power turns on, does the Error Code 82 still display?
No
The water heater seems to be normal. Try to operate again.
Yes
Replace the Printed Circuit Board and program chip

Install & adjust the proper Program chip according to the instruction. A different Program chip is required for every 3,280 feet. The Program chip is not interchangeable between Indoor and Outdoor models or type of gas. Check the number on the High Altitude Connector.

Error Code 90

Explanation: Blocked Flue. The venting system has failed the pre-purge test. At a minimum check the following:

1. Ensure maximum vertical vent length and elbows do not exceed allowable limits.
2. Ensure maximum horizontal vent length and elbows do not exceed allowable limits.
3. Check heat exchanger flapper valve at vent connection of water heater moves freely.
4. Is the entire vent structure clear and clean of any obstructions?
5. Remove all obstructions. Check the vent termination on the outside of the building and the flapper valve at the top of the heat exchanger
6. You may rule out the venting by temporarily disconnecting the vent structure from the water heater. If this fixes the problem, then the issue lies in the venting. If this does not fix the problem, then the issue lies in the blower motor or printed circuit board.

Error Code 99

Explanation: Fan Motor is not creating enough ventilation. The venting system passed pre-purge, but has failed during normal operation. At a minimum check the following:

1. Check for blockage of heat exchanger fins
2. Check heat exchanger flapper valve at vent connection of water heater moves freely.
3. Clean air intake filter.
4. Remove all obstructions. Check the vent termination on the outside of the building and the flapper valve at the top of the heat exchanger
5. You may rule out the venting portion by temporarily disconnecting the vent structure from the water heater. If this fixes the problem, then the issue lies in the venting. If this does not fix the problem, then the issue lies in the blower motor or printed circuit board.

Warning Code IL

Explanation: Unit may have lime build-up inside heat exchanger. Drain and flush unit as follows:

1. Turn off the power and remote controller(s) to the water heater.
2. Turn off the gas and water shutoff valves.
3. Disconnect the unions above the shutoff valves. (This is not required if an "ISOLATOR VALVE" is used in the water piping. See instructions provided with "ISOLATOR VALVE" for further instructions.)
4. Connect temporary fittings with ½" barb fittings on one side and union on other side to the inlet and outlet water connections.
5. Connect the pump hose outlet hose to the ½" barb fitting at the cold-water inlet fitting.
6. Connect the drain hose to the ½" barb fitting at the hot-water outlet fitting.
7. Pour approximately 5 gallons of **virgin food grade white vinegar** into a pail.
8. Place the pump or the inlet hose and the drain hose into the pail. A pond pump or similar model can be used for this application.
9. Turn on the pump and allow solution to circulate for 45 minutes.
10. Turn off the pump and drain the vinegar from the pail. Fill pail with fresh water.
11. Turn on the pump and allow the water to circulate for 15 minutes.
12. Ensure full flow of water through the water heater.
13. Turn off the pump and drain the water from the pail.
14. Repeat steps 10 thru 15 if required to ensure full flow of water through heater
15. Remove the hose from the hose and adaptor fittings from the inlet and outlet connections.
16. Connect the unions back to the water heater fittings.
17. Remove water filter in inlet of water heater and remove any sediment or dirt.
18. Return filter to water heater and screw in filter.
19. Turn on the water shutoff valves and check for leaks.
20. Turn on gas shutoff valves, power and remote control.
21. Check and ensure safe operation and performance of the water heater.

Warning Code P1

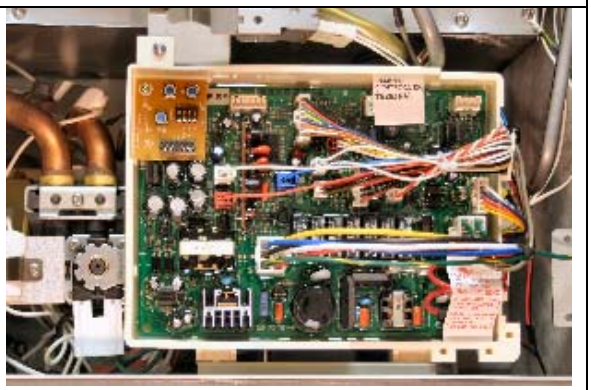
Explanation: Water flow rate is less than minimum for main burner ignition. The unit must have .66 gallons per minute before the main burner will light or sustain burner. When water flow does not reach minimum flow rate for five seconds the warning code is displayed. This warning code was introduced in September of 2007. At a minimum check the following:

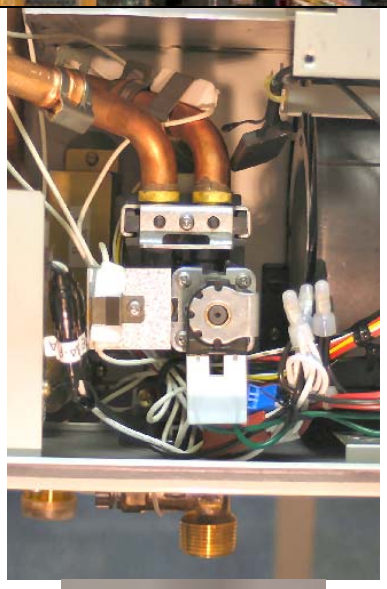
1. Check cold water inlet screen for debris.
2. Check aerator screens of fixture for debris.

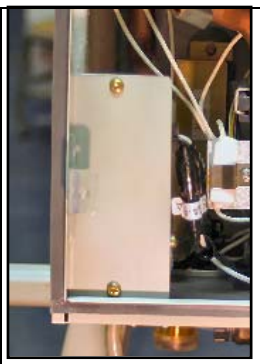
Disassembly and Repair – 1st Generation 7.4 product series

(1) When performing maintenance and/or servicing the water heater, always turn off the electric power, gas shutoff valve and water shutoff valve. Wait for the water heater to become cool. Be careful to avoid injury to your fingers on sharp edges.
(2) Drain all water from the water heater when removing the water parts.
(3) Before any disassembly, make sure you have a good diagnosis. Remove only the parts needed.
(4) Handle all parts carefully.
(5) When reassembling, prevent any foreign substance, i.e. dust, etc. from being introduced into the water heater.
(6) After reassembling, check for gas and water leakage. Then, test ignition. Make sure that there is no gas leakage in connections by testing with soap bubble solution. Bubbles indicate a gas leak that must be corrected.
(7) Check the performance and operation after servicing.

To remove and replace any part on this tankless unit, you will need a magnetic tip, #2 Phillips magnetic screwdriver that is at least 8 inches long. A flashlight and magnetic tip reach are also handy. Rheem recommends the use of a parts tray or bowl to hold small parts and screws. All of the hardware is essential to the proper operation of the unit upon re-assembly.

	Process	Illustration
1.	***Printed Circuit Board (PCB)*** a. Unscrew single screw at the top of the PCB. b. Pull PCB up and away. c. Remove all Molex connections, Remote Control connections and transformer connections if replacing the board. Otherwise, leave the connections alone.	

2.	***Air Filter Switch*** a. Remove the single screw closest to white Molex connector. b. Remove Molex if replacing air filter switch.	
3.	***Water Inlet Solenoid***; Cold Water Connection; Cold Water Inlet Thermistor d. Step 1 and e. Remove four screws on the cold water inlet connector (outside bottom of unit). f. Note the connector has a rubber o-ring and metal gasket to seal the connection. g. Remove two spring clips on cold water bypass pipes. h. Remove three freeze protection plugs. i. Remove cold water inlet thermistor. j. Remove water flow sensor. k. Disconnect the solenoid motor Molex. l. Remove Water Control Solenoid. m. Note the water bypass pipes have rubber o-rings to seal the connection.	

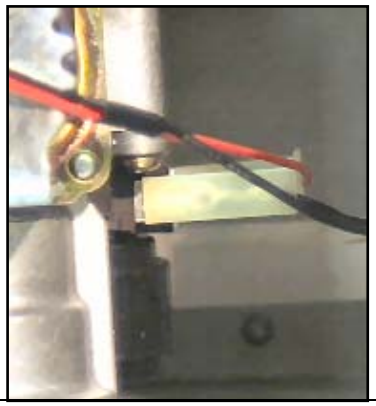
4.	***Hot Water Outlet*** Connector and Thermistor a. Step 1 and 3 plus b. Remove electrical connection box (single screw on outside left). c. Remove one ceramic heater plug. d. Remove outlet pipe bracket and ceramic heater plug. e. Remove three screws on hot water outlet connector (outside bottom of unit). f. Gently pull outlet pipe from connector and move to one side. g. Unscrew and remove drain valve. h. Rotate and remove hot water outlet thermistor from the unit. i. Remove outlet connector and retaining plate.	
5	***Transformer*** a. Step 1, 3, 4 and b. Remove the two screws holding the transformer to the back wall of the unit. c. Disconnect power lead Molex on transformer. d. Disconnect red power leads on Printed Circuit Board.	

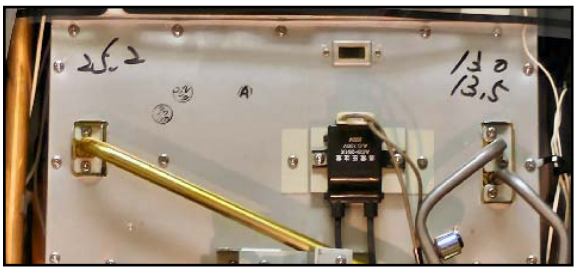
5	***Fan Assembly*** a. Step 1 and b. Clip plastic tie holding Ambient Air Thermistor. c. Disconnect Fan Assembly Molex. d. Loosen wire clip holding the wire bunch in place. e. Remove three screws (one outside bottom; one inside back left; one inside back right).	

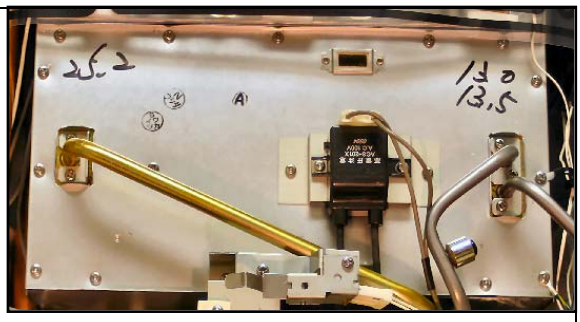
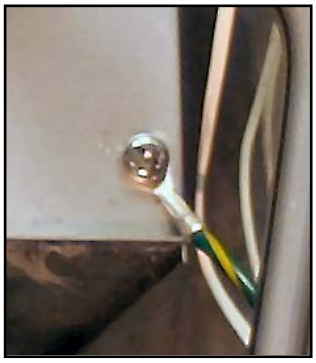
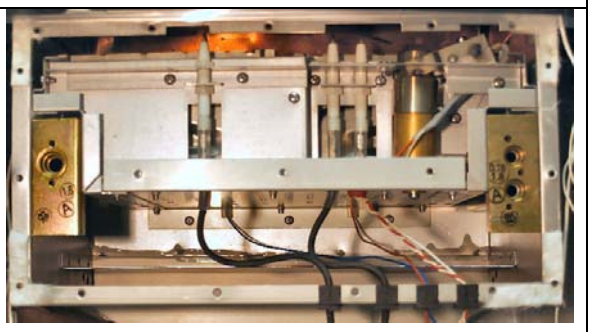
6

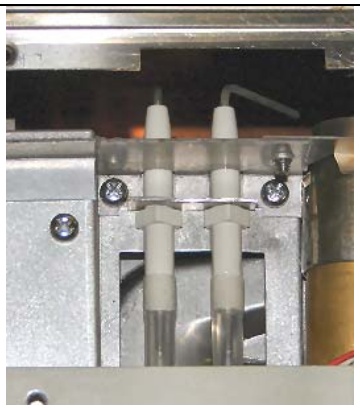
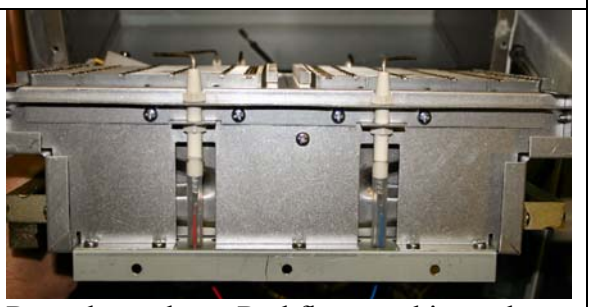
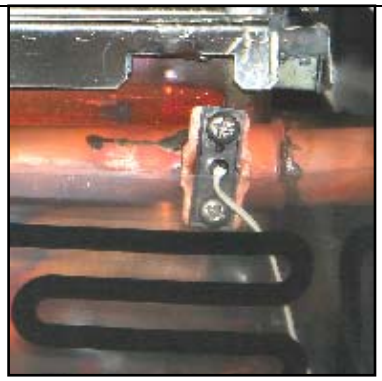
Proportional Gas Flow Regulator
(Gas Valve)

a. Step1 and
b. At the gas valve, remove the three retains clips and screws from each of the gas manifold tubes. Note the brass colored tube has a special clip; the silver colored tubes have a different clip.
c. On the burner plate cover, remove the two retaining clips and crews from the manifold supply tubes.
d. Note that each manifold tube has a rubber o-ring on each end to seal the tube.
e. Remove the three screws from the gas valve connector (outside bottom).
f. Remove the Proportional Gas Flow Regulator from the unit.
g. Disconnect all Molex connections. Note the three connections on the top of the valve are color code Blue, White and Red. They MUST be re-installed in the same location.
h. The single black (-) and red (+) connections on the bottom right side must be re-connected to proper polarity.



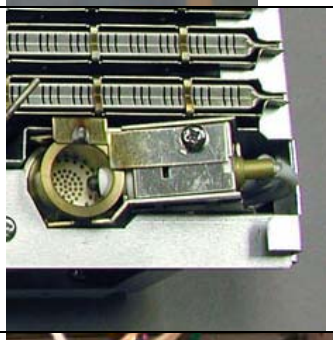
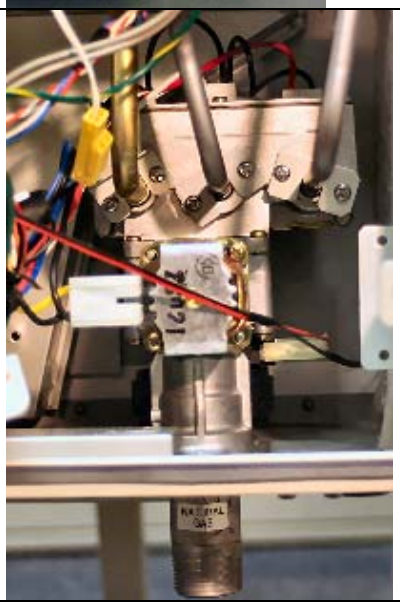


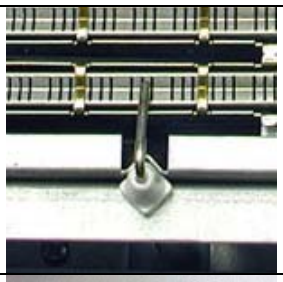
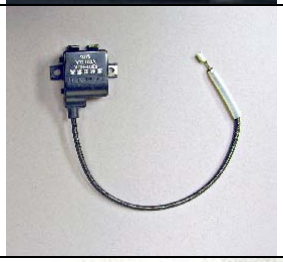
7.	***Burner Plate Cover*** a. On the burner plate cover, remove the two retaining clips and crews from the manifold supply tubes. b. At the gas valve, remove the three retains clips and screws from each of the gas manifold tubes. Note the brass colored tube has a special clip; the silver colored tubes have a different clip. c. Note that each manifold tube has a rubber o-ring on each end to seal the tube. d. Remove the two screws that hold the igniter mounting plate. e. Remove the remaining 16 screws on the perimeter of the burner cover plate. f. Remember to re-connect the green and yellow striped ground wire when reassembling cover plate.	 
8.	***Burner Assembly*** a. Step 7 and b. Remove the three screws on the bottom back wall of the burner assembly. c. Firmly pull on both sides of the burner assembly to slide it out of the chassis. d. Disconnect all igniter wires and flame probe wires. e. Note positioning of the four black plugs. They are used to prevent the wires from being damaged by the sharp edges. f. Disconnect ODS Molex on PCB.	

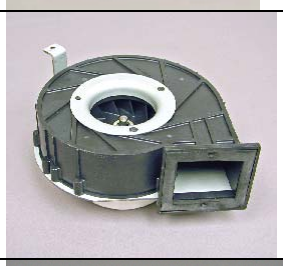
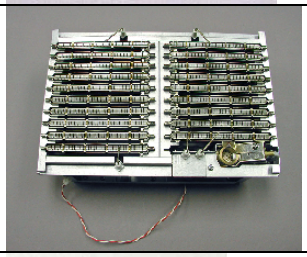
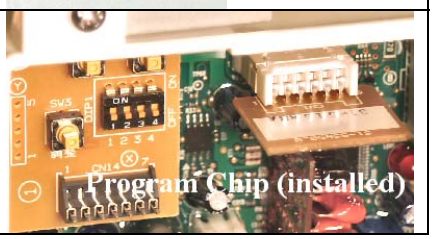
8	***Igniter and Igniter Probes*** a. Step 7 and b. Remove the two screws that hold the right hand ceramic igniter probe (black wire) on the burner chassis. c. Remove the two screws that hold the left hand ceramic igniter probe (black wire) on the burner chassis. d. Remove the igniters. e. Remove the igniter wires from the end of the ceramic probes. f. Reseat black rubber plugs to prevent wires from pinching on metal.	
9	***Flame Rod(s)*** a. Step 7 and 8 and b. Remove the two screws that hold the right hand flame rod (white wire) on the front of the burner chassis. c. Remove the four screws that hold the back side flame rods (Blue and red wire) on the burner chassis.	 Rear shown here. Red flame rod is on the left; blue is on the right.
10.	***Heat Exchanger Thermistor*** a. Remove the two screws that hold the heat exchanger thermistor in place. b. Remove the thermistor. Note there is a rubber o-ring to seal the thermistor.	

Parts

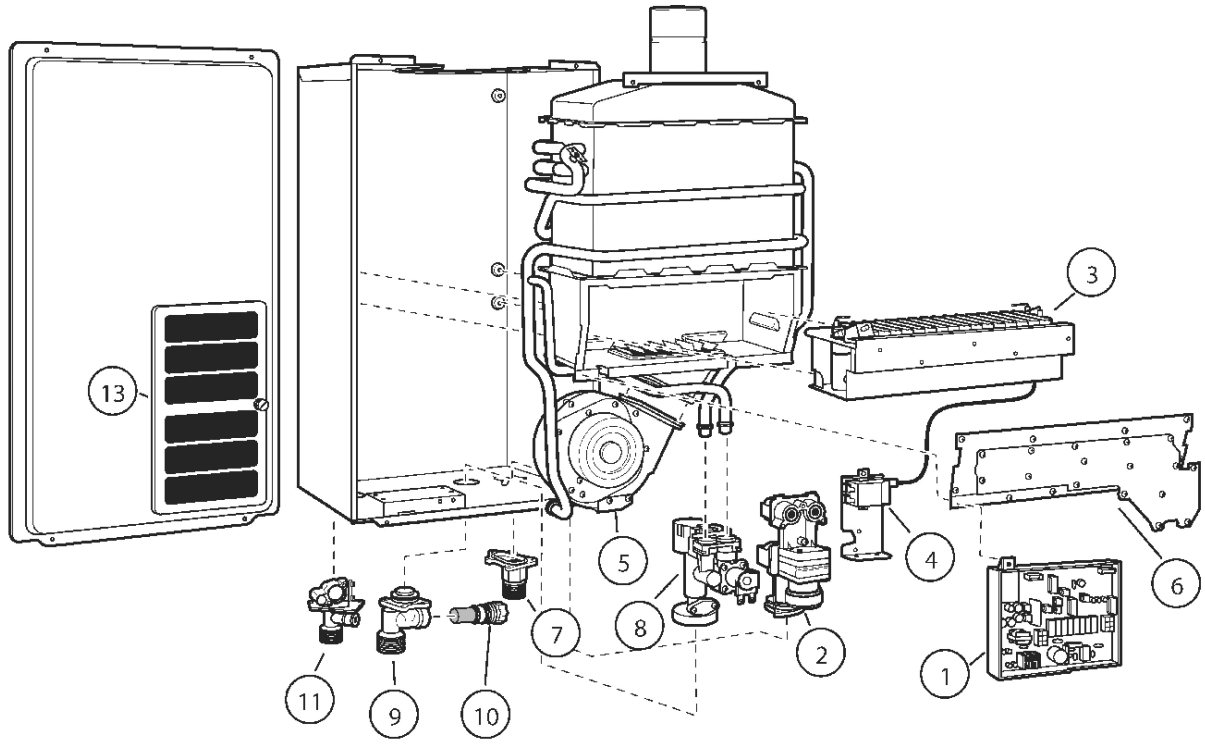
Below are the most common replacement parts. For a complete list of all replacement parts, please see the most current parts catalog.

Part	Description	Picture
Water Flow Inlet Valve	Cold water inlet valve that measures water temperature and detects flow in gallons per minute	
Oxygen Depletion Sensing Device (indoor models only)	Safety device that detects improper combustion (fuel-air mixture) and attempts to fix it	
Proportional Gas Flow Regulator Valve (P.G.R.F.)	Gas valve that modulates and only allows the amount of fuel needed to heat the water being used	

Flame Rods	Safety device that detects the presence of flame	
Igniter	Spark igniter that lights the main burner	
Thermistor(s)	A thermistor is an electronic thermostat. There are four of them: cold water inlet, hot water outlet, heat exchanger and ambient air. Shown is the cold water inlet thermistor.	
Hot water Outlet Valve	Valve that delivers the hot water to the piping system and measure the hot water outlet temperature with the aid of a thermistor.	
Gas Inlet Connection	Connection port – separate from the gas valve – to connect the incoming gas supply. Shown with supplied shut off valve.	
PCB (Printed Circuit Board)	The control board that processes all the inputs required to make the machine operate	

Remote Control	Digital control panel that allows user to adjust temperature, monitor status of the machine and review certain maintenance functions	
Air Filter Assembly	Inlet air filter (indoor models only) that keeps out lint and dust from inside the machine	
Fan Assembly	Fan (blower motor) that draws fresh air into the machine and mixes it with the fuel for burning in the combustion chamber	
Burner Assembly	Burner component that ignites the fuel-air mixture and provides heat for the heat exchanger	
Water Filter	In-line filter on the cold water inlet assembly that filters out trash and sediment	
Program Chip	Removable electronic chip that programs the fuel type, altitude level and product type and model number	 Program Chip (installed)

Parts Exploded View for RTG2-42PV and RTG 53PV

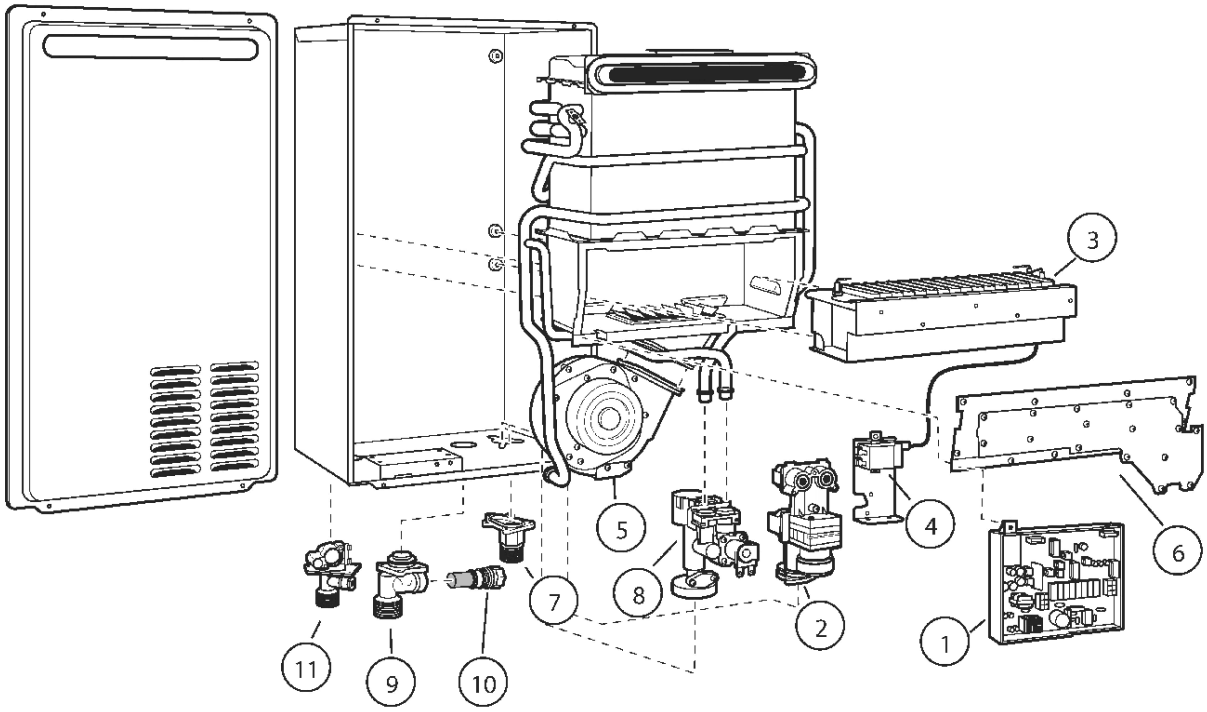


Ref #	Description
1	Control Board
	Control Board Fuse (5A)
	Power Line Fuse (3A)
	Program Chip
2	Gas Valve
3	Burner Assembly
	Flame Rod
	Ignitor Electrode
	Flame Rod Wire
4	Ignitor Coil
5	Fan Assembly

6	Burner Manifold
7	Gas Inlet Connector
8	Water Control Valve
	Inlet Thermistor -White
9	Water Inlet Connector 3/4
10	Inlet Water Filter
11	Hot Outlet Connector
	Outlet Thermistor - Black
	Drain Relief Valve
13	Door Filter Screen
N/S**	Heat Exchanger Thermistor -Yellow
N/S**	Ambient Thermistor -Blue

*PV = Power Vent (not Direct Vent)
** N/S = Not Shown

Parts Exploded View for RTG 53X

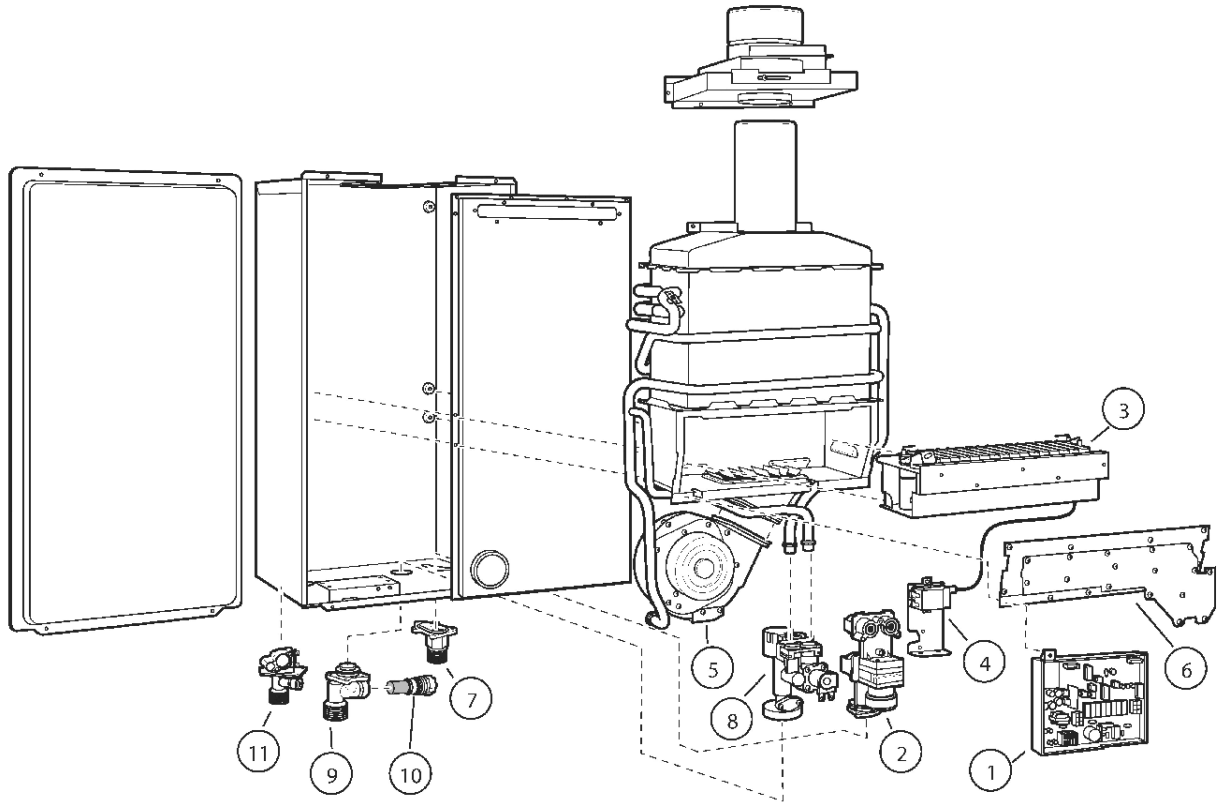


Ref #	Description
1	Control Board
	Control Board Fuse (5A)
	Power Line Fuse (3A)
	Program Chip
2	Gas Valve
3	Burner Assembly
	Flame Rod
	Flame Rod Wire
	Igniter Electrode
4	Ignitor Coil
5	Fan Assembly

6	Burner Manifold
7	Gas Inlet Connector 3/4
8	Water Control Valve
	Inlet Thermistor -White
9	Water Inlet Connector 3/4
10	Inlet Water Filter
11	Hot Outlet Connector 3/4
	Outlet Thermistor - Black
	Drain Relief Valve
N/S**	Heat Exchanger Thermistor -Yellow
N/S**	Ambient Thermistor -Blue

* X = Outdoor Model
** N/S = Not Shown

Parts Exploded View for RTG 53DV

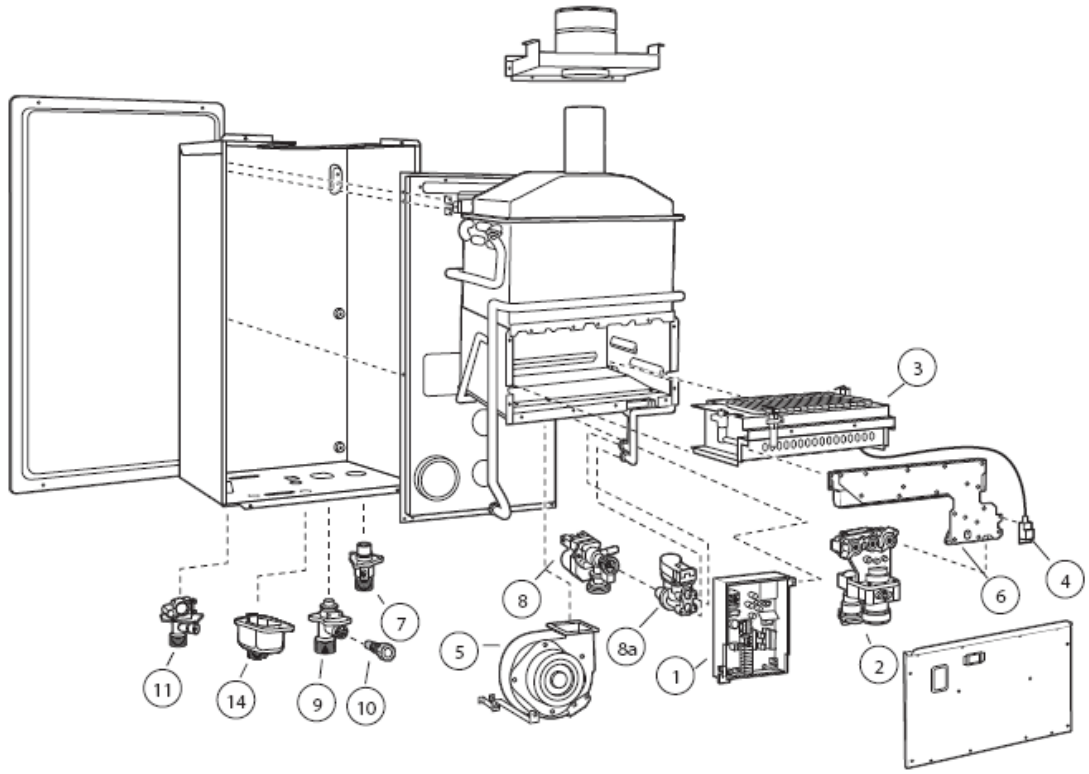


Ref #	Description
1	Control Board
	Control Board Fuse (5A)
	Power Line Fuse (3A)
	Program Chip
2	Gas Valve
3	Burner Assembly
	Flame Rod
	Flame Rod Wire
	Igniter Electrode
4	Ignitor Coil
5	Fan Assembly

6	Burner Manifold
7	Gas Inlet Connector 3/4
8	Water Control Valve
	Inlet Thermistor -White
9	Water Inlet Connector 3/4
10	Inlet Water Filter
11	Hot Outlet Connector 3/4
	Outlet Thermistor - Black
	Drain Relief Valve
N/S**	Heat Exchanger Thermistor -Yellow
N/S**	Ambient Thermistor -Blue

* DV = Indoor Direct Vent Model
** N/S = Not Shown

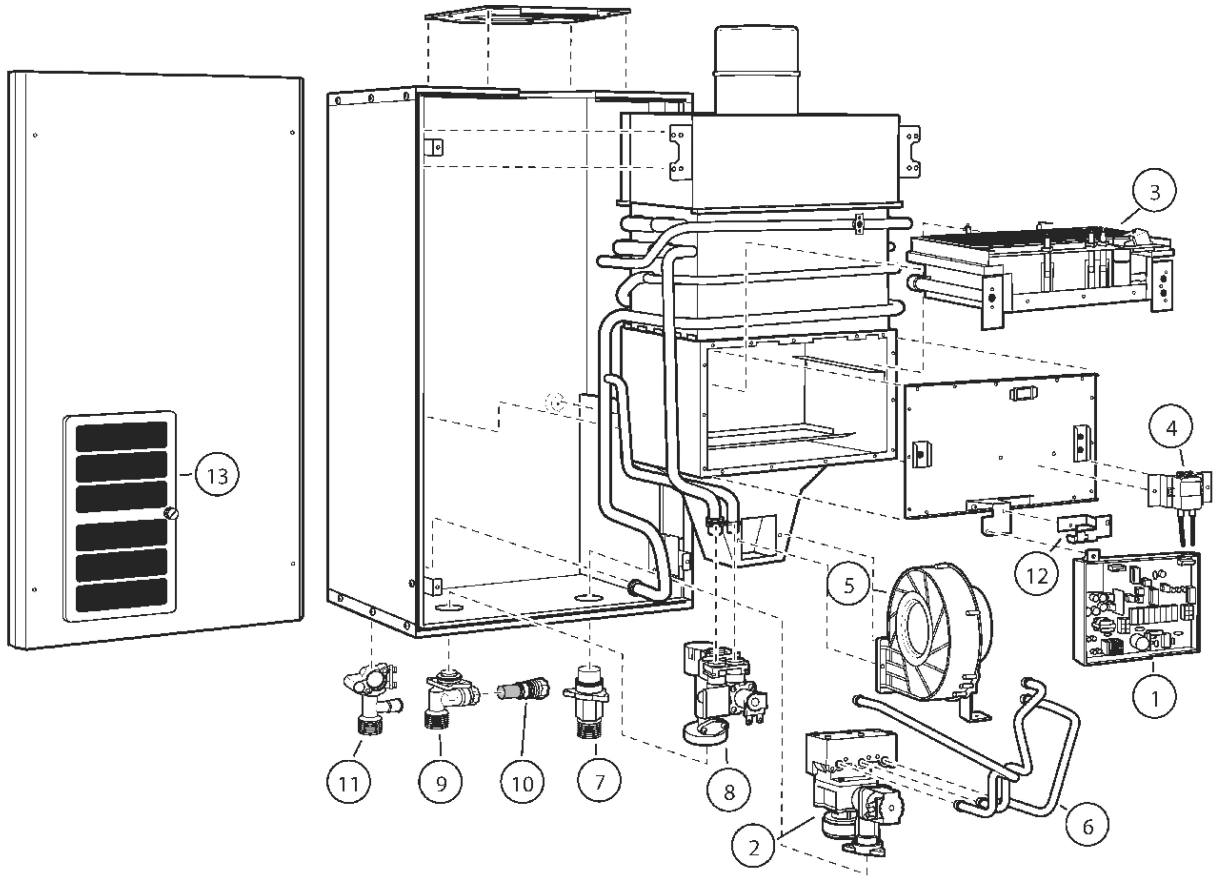
Parts Exploded View for RTG 66DV



Ref #	Description
1	Control Board
	Control Board Fuse (5A)
	Power Line Fuse (3A)
	Heat Exchanger Thermistor - Yellow
	Ambient Thermistor - Blue
2	Inlet Thermistor - White
2	Outlet Thermistor - Black
	Gas Valve - LP
7	Gas Valve - NAT
3	Gas Control Resistor
6	Gas Inlet Connector 3/4
6	Burner Assembly
	Burner Manifold - LP
	Burner Manifold - NAT
4	Sensor Orfice - LP
4	Sensor Orifice - NAT
	Ignitor Coil
5	Ignitor Electrode
	Ignitor Electrode
8	Blower Motor
8a	Blower Case
9	Water Control Valve
14	Water Bypass Valve
	Water Inlet Connector 3/4
	Remote Control Terminal Block
10	Terminal Block Wire Assy
11	Screw Pan FT 4x12
	Inlet Water Filter
	Hot Outlet Connector
	Door Screw
	Chassis Screw
	Mounting Brackets

Only fuel specific chips are required for replacement control boards. Altitude is controlled through dip switch settings and does not require a program chip. See Use and Care for details.

Parts Exploded View for RTG 74PV and GT 199PV



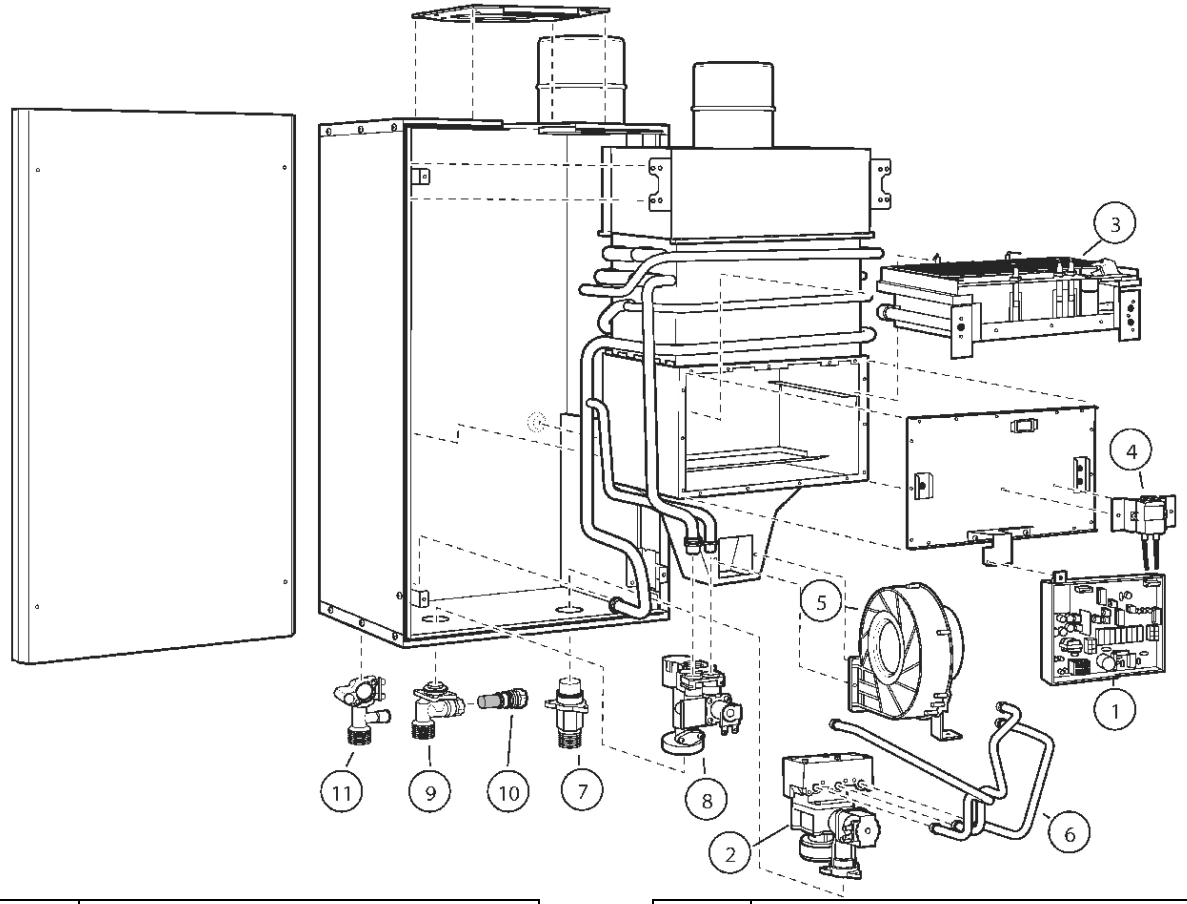
Ref #	Description
N/S**	Transformer (120v to 100v) 1st Generation only
1	Control Board
	Control Board Fuse (5A)
	Power Line Fuse (3A)
	Program Chip
2	Gas Valve
3	Burner Assembly
	Ignitor Electrode
	Flame Rod
	Flame Rod Wire
4	Ignitor Coil
5	Fan Assembly
6	Burner Supply Tubes

7	Gas Inlet Connector 3/4
8	Water Control Valve
	Inlet Thermistor -White
9	Water Inlet Connector 3/4
10	Inlet Water Filter
11	Hot Outlet Connector
	Outlet Thermistor -Black
	Drain Relief Valve
12	Door Switch
13	Door Filter Screen
N/S**	Heat Exchanger Thermistor -Yellow
N/S**	Ambient Thermistor -Blue

* PV=Indoor Power Vent Model

** N/S = Not Shown

Parts Exploded View for RTG 74DV and GT 199DV

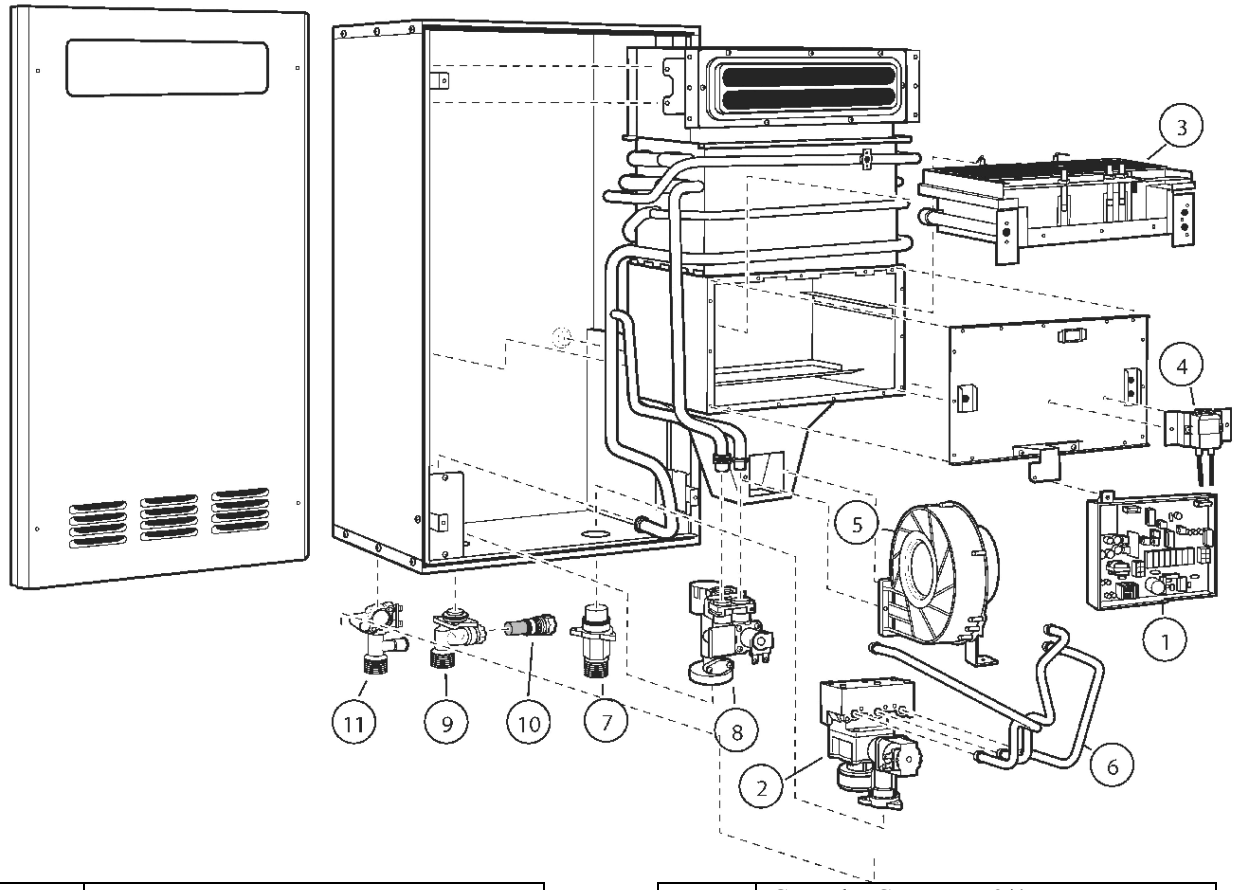


Ref #	Description
N/S**	Transformer (120v to 100v) 1st Generation only
1	Control Board
	Control Board Fuse (5A)
	Power Line Fuse (3A)
	Program Chip
2	Gas Valve
3	Burner Assembly
	Ignitor Electrode
	Flame Rod
	Flame Rod Wire
4	Ignitor Coil
5	Fan Assembly
6	Burner Supply Tubes

7	Gas Inlet Connector 3/4
8	Water Control Valve
	Inlet Thermistor -White
9	Water Inlet Connector 3/4
10	Inlet Water Filter
11	Hot Outlet Connector
	Outlet Thermistor -Black
	Drain Relief Valve
12	Door Switch
13	Door Filter Screen
N/S**	Heat Exchanger Thermistor -Yellow
N/S**	Ambient Thermistor -Blue

* DV=Indoor Direct Vent Model
** N/S = Not Shown

Parts Exploded View for RTG 74X and GT 199X



Ref #	Description
N/S**	Transformer (120v to 100v) 1st Generation only
1	Control Board
	Control Board Fuse (5A)
	Power Line Fuse (3A)
	Program Chip
2	Gas Valve
3	Burner Assembly
	Ignitor Electrode
	Flame Rod
	Flame Rod Wire
4	Ignitor Coil
5	Fan Assembly
6	Burner Supply Tubes

7	Gas Inlet Connector 3/4
8	Water Control Valve
	Inlet Thermistor -White
9	Water Inlet Connector 3/4
10	Inlet Water Filter
11	Hot Outlet Connector
	Outlet Thermistor -Black
	Drain Relief Valve
12	Door Switch
13	Door Filter Screen
N/S**	Heat Exchanger Thermistor -Yellow
N/S**	Ambient Thermistor -Blue

* X =Outdoor Model
** N/S = Not Shown

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